Upper Little Tennessee
Watershed Management Plan

September 2015

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Upper Little Tennessee Watershed Management Plan

September 2015

A project of:

CITY OF DILLARD

Prepared by:

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List of Acronyms and Abbreviations

ACEP	Agricultural Conservation Easement Program
AFS	Air Facility System
BMP	Best Management Practice
CAFO	Confined Animal Feeding Operation
CAP	Corrective Action Plan
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
COG	Council of Government
Coweeta LTER	Coweeta Long Term Ecological Research
CRP	Conservation Reserve Program
CWA	Clean Water Act
DARC	Development Authority of Rabun County
DO	Dissolved Oxygen
ECHO	Enforcement and Compliance History Online
EPA	Environmental Protection Agency
EPD	Environmental Protection Division
EQIP	Environmental Quality Incentives Program
FEMA	Federal Emergency Management Agency
FOTL	Fruit of the Loom
GA DNR	Georgia Department of Natural Resources
GA DOL	Georgia Department of Labor
GIS	Geographic Information Service
HRS	Hazard Ranking System
HSI	Hazardous Site Inventory
HUC	Hydrologic Unit Code
IBI	Index of Biological Integrity
IBT	Interbasin Transfer
ICIS	Integrated Compliance Information System
LAS	Land Application System
LTER	Long Term Ecological Research

LTLT	Land Trust for the Little Tennessee
LTNPST	Little Tennessee Nonpoint Source Team
LTWA	Little Tennessee Watershed Association
LUST	Leaking Underground Storage Tank
MGD	Million Gallons/Day
NC EEP	North Carolina Ecosystem Enhancement Program
NFWF	National Fish and Wildlife Foundation
NLCD	National Land Cover Data
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	Nonpoint source
NRCS	Natural Resources Conservation Service
RC&D	Resource Conservation & Development Council
RCRA	Resource Conservation and Recovery Act
RGNS	Rabun Gap-Nacoochee School
SEMS	Superfund Enterprise Management System
SVAP	Stream Visual Assessment Protocol
SWAP	State Wildlife Action Plan
SWCD/SWCC	Soil & Water Conservation District/Soil and Water Conservation Council
TAC	Technical Advisory Committee
TCE	Trichlorethene
TMDL	Total Maximum Daily Load
TRI	Toxics Release Inventory
TSS	Total Suspended Solids
UGA	University of Georgia
UNESCO	United Nations Educational, Scientific and Cultural Organization
USDA	United States Department of Agriculture
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds

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Executive Summary

In spring of 2014, the City of Dillard, Georgia was awarded an EPA Section 319 grant from the Georgia Environmental Protection Division to prepare a 9 Element Watershed Management Plan for the upper Little Tennessee River. This is a community-driven planning process that seeks to identify the causes of impaired (or polluted) waterways within a specific watershed. The purpose of this report is to outline voluntary actions that will result in improvement of water quality and habitat within the upper Little Tennessee River in Rabun County, Georgia.

A Technical Advisory Committee (TAC) was assembled at the start of this process to provide technical expertise in the evaluation of watershed conditions and to help suggest appropriate management measures to address potential impacts. This team consisted of representatives from commercial agricultural operations (both organic and conventional), industry, tourism and development, forestry, local and county government, water and wastewater services, State and Federal resource agencies, conservation organizations, educational institutions, and residents/landowners. Additional stakeholders were engaged through public meetings, one-on-one contact and via an online survey.

This report details the input received and addresses the EPAs required 9 elements, which include:

1. Identification of causes and sources of pollution that need to be controlled.
2. Estimate pollutant load reductions needed.
3. Develop management measures needed to achieve goals, including restoration and protection measures, future impacts in the watershed, etc.
4. A schedule for implementing the management measures identified in the plan.
5. Interim milestones for determining whether nonpoint source management measures or other management control actions are being implemented.
6. A set of criteria that can be used to determine whether pollutant load reductions are being achieved over time.
7. A monitoring component to evaluate the effectiveness of the implementation efforts over time.
8. An information and education component that will be used to enhance public understanding of the project.
9. An estimate of the amount of technical and financial assistance needed to implement the plan.

Initial stakeholder input was used to identify potential stressors to water quality and to select water quality monitoring sites to help verify suspected sources of pollution. Chief public concerns include erosion and sediment impacts, agricultural impacts and industrial/factory waste. It is important to note that two areas of the watershed have been documented as having water quality and/or habitat impacts, and as a result the State of Georgia has placed them on its impaired waterways list.

An impaired waterway is one that is not meeting its designated use. Waters in the project area not meeting their designated uses include Keener Creek in Wolffork Valley (listed for habitat impacts/sediment) and the mainstem Little Tennessee from Dillard to the NC/GA state line (listed for bacteria).

The project area was characterized with a review of physical features and habitats; cultural history, land use, economy and demographics; and water resources/waste management practices. Although many areas of the watershed maintain high levels of undeveloped forest cover, impacts from agricultural use, development and potentially failing septic tanks are apparent.

Over the course of this planning process, all previously collected data that could be amassed in a reasonable amount of time was reviewed and evaluated. During plan development, Rabun Gap-Nacoochee School (RGNS) students collected limited water chemistry and bacterial data while the Biomonitoring staff at the Land Trust for the Little Tennessee (LTLT) collected fish-based IBI (biological integrity) data and limited macroinvertebrate data. A visual assessment was also conducted to help assess watershed conditions. The results of this comprehensive data review indicate the following potential impacts:

Wolffork Valley and Tributaries

- Fecal coliform from nonpoint source agricultural runoff
- Possible septic system failures along upper Keener Creek
- Habitat impacts from minimal riparian buffers, livestock access and historic channelization
- In stream trash dumping requiring an organized cleanup
- Habitat impacts from herbicide use along streams

Mainstem and Tributary Streams from US 441 to Betty Creek Confluence

- Fecal coliform from nonpoint source agricultural runoff
- Habitat impacts from minimal riparian buffers, livestock access and historic channelization
- Some habitat impacts from herbicide use along streams
- Potentially failing septic system

Betty Creek Watershed and Tributary Streams

- Sedimentation from road runoff and impoundments
- Possible nutrient loading from various sources, more study needed
- Slight fecal coliform pollution from nonpoint source agricultural runoff
- Habitat impacts from selected areas with minimal riparian buffers and livestock access

Mainstem and Tributary Streams from Betty Creek to Mud Creek Confluence

- Fecal coliform from nonpoint source agricultural runoff and livestock access on the mainstem

- Possible septic system failures along upper Darnell Creek and Kelly Creek
- Nutrient loading from maintained lawns and pastures, possibly also from fish feeding at ponds
- Habitat impacts from minimal riparian buffers and livestock access on the mainstem and lower Kelly Creek
- Quarry dust sedimentation entering a tributary stream through stormwater runoff causing habitat impacts
- Trash dumping requiring an organized cleanup
- Habitat impacts from herbicide use along streams
- DOT aprons creating a barrier for aquatic organism passage on Darnell and Kelly Creeks

Mud Creek to the State Line

- Habitat impacts from residential development resulting in sedimentation
- Habitat impacts from narrow or non-existent riparian buffers and historic channelization
- Possible nutrient loading from cumulative effects of maintained lawns, golf course, row crops and pastures
- Potential herbicide and fertilizer use along tributary streams causing habitat impacts
- DOT apron creating a partial barrier for aquatic organism passage on Mud Creek

Areas listed by the State of Georgia as impaired waterways are required to have a Total Maximum Load (TMDL) document prepared. A TMDL document details pollution reduction thresholds needed in order to restore water quality. The TMDL for the mainstem Little Tennessee cites a 69% load reduction in fecal coliform bacteria is required to restore water quality. The final Keener Creek TMDL is expected in the fall of 2015. Other impacts documented as a result of this planning process do not require load reduction calculations, but management measures are suggested to address these potential impacts.

The following strategies are recommended in this plan to address potential and identified impairments to water quality:

1. Implementation of agricultural best management practices (BMPs) including livestock fencing, riparian buffer planting/enhancement, alternative livestock watering device installation with stream access restriction, and nutrient management planning.
2. Residential riparian buffer planting/enhancement activities.
3. Coordinated effort to identify failing septic systems and a funding program to assist with repair/replacement.
4. Development and distribution of education materials and funding to host informational workshops tailored to agricultural facility managers and residential homeowners. Topics include riparian habitat protection, enhancement and restoration; fertilizer and nutrient management, herbicide application BMPs and general water quality protection strategies.

5. Golf course management BMP implementation and possible participation in Audubon International's "Cooperative Sanctuary Program for Golf" to improve and protect habitat conditions.
6. Local ordinance changes to clarify development limitations in designated water supply watersheds, thus providing further riparian habitat protection.
7. Trash cleanups where illegal trash dumping has been occurring.
8. Identification, prioritization and conservation of existing wildlife corridors on private lands and other areas with outstanding habitat/riparian buffer maintenance practices.
9. Additional studies and monitoring as needed.

In order to successfully implement this plan, substantial investments of time and financial resources are needed. The first step toward implementation includes the identification of an organization or agency willing to take responsibility for seeking funding and managing implementation activities. Additionally, the creation of a new Implementation Coordinator position is needed to lead implementation activities. These activities include conducting landowner outreach, coordinating partners, seeking additional implementation funding, managing restoration/enhancement activities and organizing public education events.

Once a qualifying entity is committed to undertaking the implementation of this plan and an Implementation Coordinator has been identified, a Georgia nonpoint source 319 grant can be applied for to fund initial activities and to help pay for the Implementation Coordinator position. Funding for agricultural BMP activities is available through the Natural Resource Conservation Service (NRCS) and other United States Department of Agriculture (USDA) funding programs. Residential BMP programs and outreach activities may be funded through the 319 nonpoint source grant program and/or private grants. Other potential sources of funding may come from state and federal agency partners, depending on the project.

The Rabun County Health Department has funding to help identify failing septic tanks and dye tests are currently offered free to Rabun County businesses and residents. Funding for cost-share septic system repair or replacement may be secured through Georgia 319 nonpoint source grant funding or through a collaborative grant request with the Health Department to USDA rural development grant programs. Audubon's golf course habitat certification program also offers technical support and limited funding during the certification process. Local civic groups are a great source for both funding and volunteer labor to assist with small projects such as trash cleanups.

Ideally, implementation should begin as soon as a 319 nonpoint source grant is secured, and the earliest possible start date for that is fall 2016. An initial three-year implementation period is outlined. This phased approach is suggested to allow adequate time to identify and prioritize potential projects and secure additional funding as needed. Long-term and short-term monitoring strategies include visual assessments, biological monitoring and water chemistry/bacterial sampling to evaluate the success of completed projects.

Introduction

What is a Watershed Management Plan?

A 9 Element Watershed Management Plan is a community-driven planning process that seeks to identify the causes of impaired (or polluted) water resources within a specific watershed. A Watershed Management Plan seeks to propose voluntary actions that will result in improvement of water quality and habitat. Such plans are meant to provide a framework for the restoration of an impaired watershed and guidance for future protection of the watershed. The U.S. Environmental Protection Agency (US EPA) provides funding and guidance for the development of watershed management plans.

EPA's 9 Elements

According to the EPA, a watershed approach is geographically focused, is defined hydrologically, addresses all stressors, involves community stakeholders and addresses defined watershed management goals. The EPA has outlined 9 elements that should be addressed in a successful watershed management plan:

1. Identification of causes and sources of pollution that need to be controlled.
2. Estimate pollutant load reductions needed.
3. Develop management measures needed to achieve goals, including restoration and protection measures, future impacts in the watershed, etc.
4. A schedule for implementing the management measures identified in the plan.
5. Interim milestones for determining whether nonpoint source management measures or other management control actions are being implemented.
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9. An estimate of the amount of technical and financial assistance needed to implement the plan.

Point Source vs. Nonpoint Source Pollution

When reviewing this plan, it is important to understand the difference between point source pollution and nonpoint source pollution. A point source is a "discernible, confined, and discrete conveyance of pollution" (e.g. a discharge from a sewage outflow-pipe or factory). Nonpoint source pollution is pollution that does not come from a distinct source like a pipe. Nonpoint source pollution is carried by overland flow of water from rain, irrigation, or snowmelt that picks up contaminants as it hits the earth and rolls

downhill toward a water body. Nonpoint source pollution is the leading cause of water quality problems in the US, depositing excess nutrients, oil and gasoline, fecal coliform and other contaminants into our waterways. This plan mainly focuses on addressing nonpoint source pollution.

Upper Little Tennessee Watershed Plan Project Summary

This project grew out of a December 2012 meeting organized by representatives from Georgia's Department of Natural Resources Wildlife Resources and Environmental Protection Divisions and staff at the Land Trust for the Little Tennessee. Also in attendance were representatives from other local conservation groups, community stakeholders, various North Carolina state agency representatives and the U.S. Fish and Wildlife Service. The purpose of this meeting was to discuss the status of water quality and habitat within the portion of the Little Tennessee River watershed located in Georgia and to brainstorm ways to implement conservation strategies that are complementary to recent efforts in North Carolina.

The City of Dillard stepped forward to pursue a watershed planning effort, and in April 2014, the Georgia Environmental Protection Division awarded EPA Section 319 grant funding to the City of Dillard to prepare a 9 Element Watershed Management Plan. In May 2014, the City of Dillard contracted with Broadfork, LLC to complete the work.

The EPA and the EPD prefer to use the Hydrologic Unit Code (HUC) 10 watershed boundaries as assigned by the USGS for 9 Element Plans. The HUC 10 for the Upper Little Tennessee River and the project area for this plan is 0601020201.

The USGS describes HUCs as follows: The United States is divided and sub-divided into successively smaller hydrologic units which are classified into four levels: regions, sub-regions, accounting units, and cataloging units. The hydrologic units are arranged or nested within each other, from the largest geographic area (regions) to the smallest geographic area (cataloging units). Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to eight digits based on the four levels of classification in the hydrologic unit system.

Project Need and Goals

The purpose of this plan is to provide the communities of the Georgia portion of the Upper Little Tennessee River watershed with a roadmap to systematically define and address watershed pollution through appropriate management strategies. This plan is also meant to complement similar efforts that have recently been undertaken in various areas of the North Carolina portion of the watershed. Specifically, the *Franklin to Fontana Local Watershed Plan (also known as F2F)*, which was completed in 2011, and the *Upper Cullasaja Watershed Management Plan*, which was updated in 2013.

The 2011 F2F planning process was spearheaded by the North Carolina Ecosystem Enhancement Program (EEP), and resulted in a comprehensive watershed plan for the area located between Franklin, North Carolina and the Fontana Reservoir in North

Carolina. The plan was designed to meet the EEP's watershed plan criteria, but it is currently being revised to meet the EPA's 9 Key Elements of Watershed Planning criteria as well.

The 2013 Upper Cullasaja Plan was undertaken by the combined Land Trust for the Little Tennessee/Little Tennessee Watershed Association (now known as LTLT) with a grant from the North Carolina Department of Environment and Natural Resources and the EPA's Section 319 grant program. The 2013 version of the plan is an update to a previously completed 9 Element Plan for the Upper Cullasaja Watershed and focuses on addressing urban stormwater pollution.

A vision of the partners involved in watershed restoration and conservation of the Little Tennessee River is to complete watershed management plans for the entire Little Tennessee River basin, and this plan brings us one step closer to achieving that vision. The goals of this plan are to encourage conservation action to achieve load reduction targets in a way that promotes ownership among community stakeholders and citizens; and to improve our competitiveness in leveraging funding and resources for the implementation of conservation actions identified in this plan. A technical advisory committee (TAC) was developed in order to ensure stakeholders engaged or residing in this portion of the watershed had input to this plan, and to garner their support.

Project Timeline Overview

Work on the project began immediately following the EPD Section 319 grant award to the City of Dillard. In fact, contacts with local stakeholders were underway as the grant application was being developed in order to gauge community interest and generate support for the project. This support enabled a quick launch of the plan development process once funding was received. Figure 1 below shows major milestones and public input opportunities over the course of the project period.

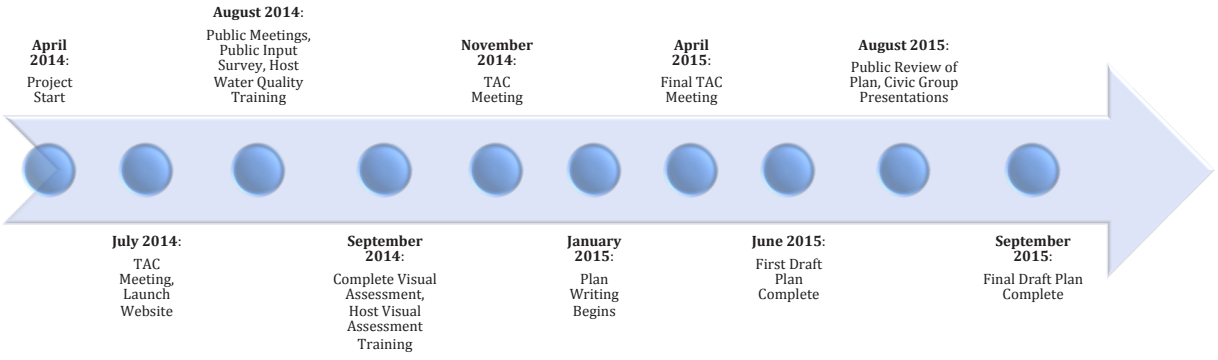


Figure 1: Timeline of Plan Development Activities

The first few months of the project were spent working on landowner and stakeholder outreach to adequately engage people in the development of the plan. Personal contact was made with many landowners, and opportunities were advertised via local radio and newspaper press releases. There is also a local email list called the "town crier" which graciously forwarded these releases to the 1,100+ subscribers on its list.

The entire project was completed over the course of 18 months, with the last 2-3 months reserved for public review and editing of the final plan. Throughout the duration of the project, Rabun Gap-Nacoochee School (RGNS) student volunteers conducted quarterly chemical and bacterial water quality monitoring to help identify undocumented problems and other areas in need of further attention.

Outreach Activities

Several opportunities for stakeholder input and participation were provided in a robust public outreach effort. An informational website was created which supported a blog and an e-newsletter, and a series of public input meetings were organized. A community survey was developed, provided online, and remained open for nearly two months to collect stakeholder and residents' observations and opinions about water quality in the Georgia section of the Little Tennessee River watershed. A series of workshops were held to train volunteers in water quality monitoring, and opportunities to participate in monitoring activities with project partners were advertised via the e-newsletter, website and blog.

Stakeholder Committee Development

The stakeholder committee (also referred to as the "Technical Advisory Committee" or "TAC" in this plan) is a core group of people who played a more detailed role in the planning process. Members were invited to participate at this level based on their role in the community or the watershed, as well as their availability and interest in the project. Representatives included those from commercial agricultural operations (both organic and conventional), industry, tourism and development, forestry, local and county government, water and wastewater services, State and Federal resource agencies, conservation organizations, educational institutions, and residents/landowners.

The TAC was formed in July 2014 and members were added as additional contacts or other interested parties were identified. The TAC met a total of three times over the course of the project (see Figure 1), with some members also providing one-on-one input and email input. A significant effort was made to accommodate stakeholder schedules so that each TAC meeting balanced representation from local industry and businesses as well as resource agencies and conservation organizations.

Public Meetings

Persons not participating on the TAC were encouraged to participate in the identification of watershed stressors/concerns via public meetings held in July and August of 2014. Nine citizens attended the July 29, 2014 meeting and sixteen people attended a meeting held on August 7, 2014. At each meeting, a presentation was given about the watershed management planning process along with details about the goals of the planning effort. Questions and comments were solicited via an open forum facilitated by Broadfork staff. Issues of concern and questions about the planning process are documented in the meeting notes, which are found in **Appendix A**.

Figure 2: Participants at a public meeting review a presentation and fill out surveys.

Public Input Survey

All public meeting participants received a paper copy of the input survey and the responses were recorded manually in the online survey platform, which was hosted via Survey Monkey. The survey remained open online for 55 days, and a total of 39 people (including meeting attendees) responded to the 10-question survey.

Of the 39 people responding, approximately 75% (29 people) identified themselves as residents of the watershed. Additionally, 33% (13 people) said they are recreational users of the watershed and 15% (6 people) said that they are involved in business or industry in the watershed. A few respondents identified themselves as all three of the above (a resident, recreational user, and involved with business or industry). Others identified themselves as interested parties due to affiliation with conservation organizations, agencies or work groups focused on water availability and quality. Two respondents from local governments participated in the survey.

The second question asked respondents to select an age category. Every participant answered this question with the highest response rate (43%) in the 60+ age range. The lowest response rate was in the 18-20 and 17 and younger categories, both of which have zero respondents. With a total of 39 responses received in the age category question, 75% of the respondents were age 50 and over. While this is certainly a reflection of area demographics, it also indicates that the opinions of those under age 50 may be underrepresented in the ideas and concerns expressed in the results.

The third survey question asked respondents to identify recreational activities that they enjoy in the Upper Little Tennessee River watershed. The top five answers included fishing, hiking, walking/jogging, kayaking/canoeing and swimming. All 39 respondents answered this question, and survey takers were able to select more than one option. Of the 39 respondents, 48% (or 19 people) said they use the area for fishing, and 30% (12 people) said they use the watershed for kayaking/canoeing. Similarly, 28% (or 11 people) use the area for swimming.

When asked why they value the Upper Little Tennessee watershed, survey takers cited its scenic beauty as the top choice with 92% (or 36 people) selecting this choice. Wildlife habitat and recreational opportunities were the next highest-ranking responses, with approximately 80% (31 respondents) and 62% (24 respondents), respectively. The watershed is also valued as a drinking water supply with 59% (or 23 respondents) selecting this option. See figure 3 below for more details.

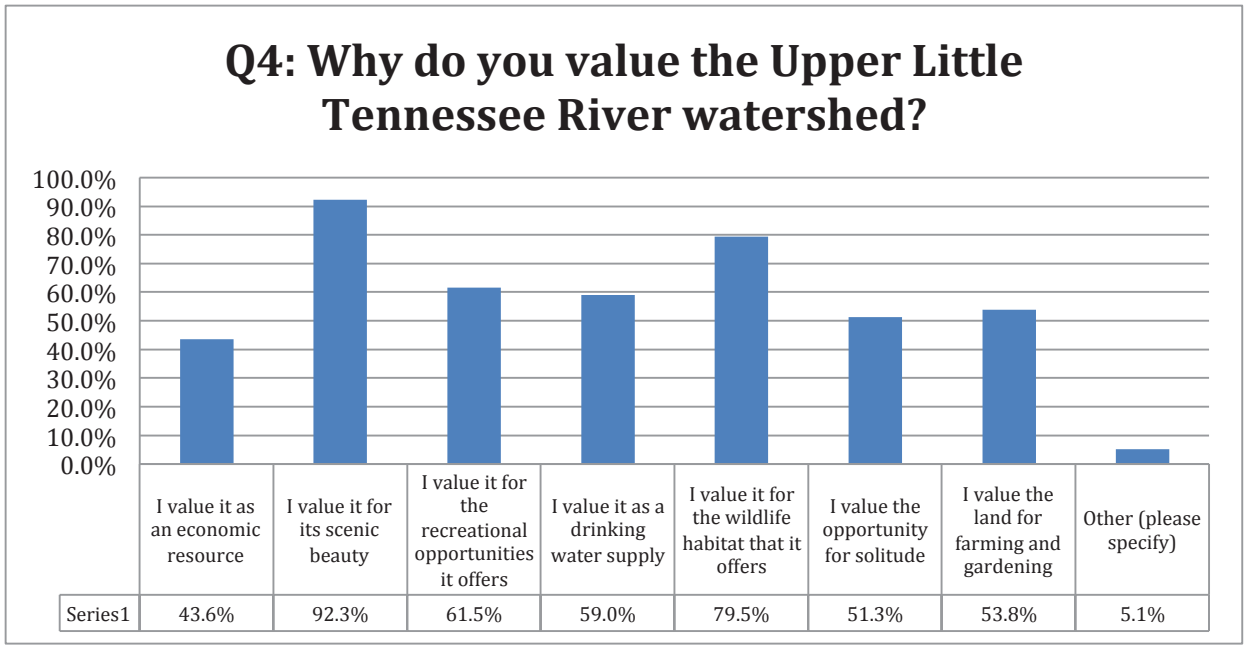


Figure 3: Public Input Survey - Question #4 Answers

Question number five asked survey-takers to identify water quality concerns, and all 39 respondents answered this question. The top concern reported is erosion and

sedimentation, with 64% (or 25) of respondents citing it as a concern. This is followed by agricultural impacts (54%), industry and factory waste (49%), waste from sewage plants 44%), and parking lot runoff/stormwater (44%). Participants were allowed to check more than one area of concern so percentages are based on the number of categories checked and the total number of respondents. Only one respondent reported no concerns with water quality. See Figure 4 for specific details and percentages related to question 5 of the survey.

There was also an opportunity to fill in a blank area with concerns, and four people responded. Their concerns include debris/fallen trees/dead animals in waterways and the use of pesticides.

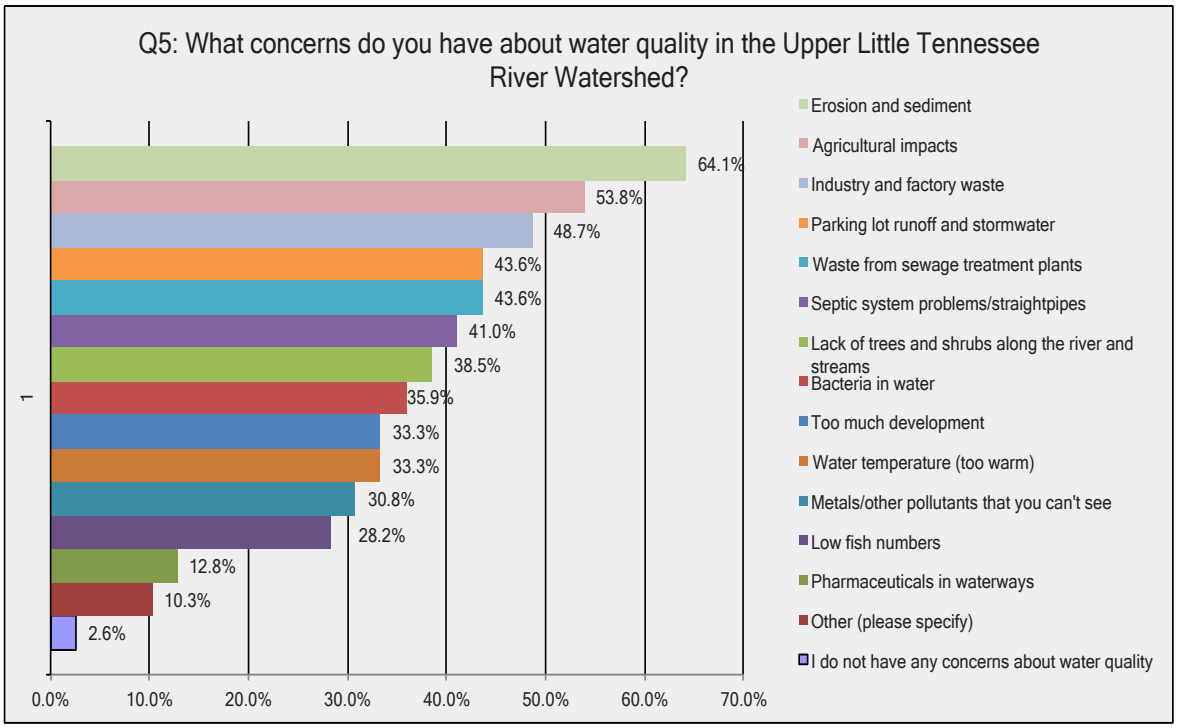


Figure 4: Public Input Survey - Question #5 Answers

The next two survey questions (questions 6 & 7) asked respondents to identify the areas of the watershed they believed had the best water quality and those areas where water quality needs improvement. Of the 39 survey takers, 15 and 16 people elected to answer questions six and seven, respectively. It should be noted that question number 6 provided fill-in-the-blank spaces for three answers, while question number 7 allowed for up to five areas to be listed. Less than half of the total survey respondents elected to answer these questions, and several provided only one or two answers for each of these questions.

Of the answers received, Betty Creek and Darnell Creek are the two most frequently cited areas supporting good water quality and habitat. Other areas mentioned include Keener

Creek, Sutton Branch, and Rickman "Branch" (Creek) with one mention each. Streams listed that are outside the defined project area for this plan are not included in this result.

The mainstem Little Tennessee River and Wolffork Valley are the most cited as needing improvement in water quality and habitat. Other areas suggested once each include Betty Creek, headwater tributaries of Betty Creek and Black's Creek.

In summary, most of the stakeholders responding to this survey perceive Betty Creek and Darnell Creek as having the best water quality, and the mainstem of the Little Tennessee River and Wolffork Valley as the areas most in need of water quality and habitat improvements.

Question number 8 is structured as an open-ended question asking respondents to identify specific problems in the areas identified as needing improvement. Of the 39 people who participated in the survey, 16 answered this question. The answers provided are as follows:

- Inadequate stream buffers, cattle access to streams, row crop agriculture too close to streams
- Sediment from agriculture and road runoff
- Industrial waste, agricultural runoff, chemical runoff, lack of riparian zone
- Runoff from agricultural fields, water doesn't run freely renewing itself, dead animals in water, chemicals/toxins leaking from wastewater, etc.
- Agricultural runoff, over development of the area and slopes
- Agricultural and road building impacts
- Sedimentation, cattle in streams, lack of buffers
- Bacteria/pesticides, few bees
- Livestock, agricultural runoff, garbage and other pollution, bank erosion
- Sediment problem in Wolffork and Mainstem
- Cattle and agricultural runoff
- Poor agricultural practices, little riparian vegetation
- Concerned about agriculture runoff including herbicides, insecticides and animal waste
- Sewage contamination, excessive siltation
- Assimilative capacity for future residential and industry expansion
- We suspect [pollution] but don't have proof

*Words in [ ] added by author for clarity.

In the answers given for question 8, impacts from agricultural practices including those associated with livestock and row crops were the most frequently cited water quality concern with approximately 15 mentions combined. It should be noted that much of the concern regarding agriculture is associated with stormwater runoff. Inadequate buffers, sedimentation, and industrial wastewater/toxic waste concerns are the second most frequently cited problems, with approximately 5 mentions each.

Similarities are apparent when compared to the answers given in question 5, which asked respondents to identify general areas of concern with regard to water quality (vs. problems in the areas specifically cited in question 7). See Table 1, which lists the top five answers given for both questions, in descending order. Also note that the word 'runoff' is frequently used in question 8 answers. Runoff is another word for 'stormwater.'

Table 1: Public Input Survey - General Concerns vs. Issues Specific to Mainstem and Wolffork

Q5 Answers: General Water Quality Concerns	Q8 Answers: Water Quality Concerns in Mainstem and Wolffork
Erosion and Sediment	**Livestock**
Agricultural Impacts (includes livestock)	**Row Crop Agriculture**
Industry and Factory Waste	**Buffers**
Stormwater	**Sedimentation**
Sewage	**Waste – Sewage & Industrial/Toxic**

Table 1 is important because it identifies public concerns about water quality and habitat that inform the development of this plan. Both questions, although structured differently, essentially point to the same set of concerns.

The next (and essentially last) question of the survey asked respondents what they believe the barriers are to addressing the identified water quality concerns. Of the 39 total people who took the survey, 28 responded to this question. Survey takers had the option of selecting more than one answer.

Seventeen people (or 60%) responded that a lack of community interest in the issue of water quality is holding back improvement. Another fifteen people (approximately 54%) responded that the community has no knowledge of the source of the pollution. The next most popular reason identified is a lack of leadership to implement change, with thirteen people (or 46%) selecting this answer. Nine people (or 32%) suggest that there isn't enough money to address the problems, and five people provided responses in an "other" blank. Those "other" reasons listed by survey takers include business self-interests and business non-cooperation, multiple jurisdictions in the Little Tennessee watershed, lack of public access to waterways, and economic impact of agriculture.

Fortunately, the number of people suggesting that the problems are too big to address is low, which indicates optimism among the public that water quality and habitat problems can be addressed with adequate funding and cooperation. See Figure 5 for more details.

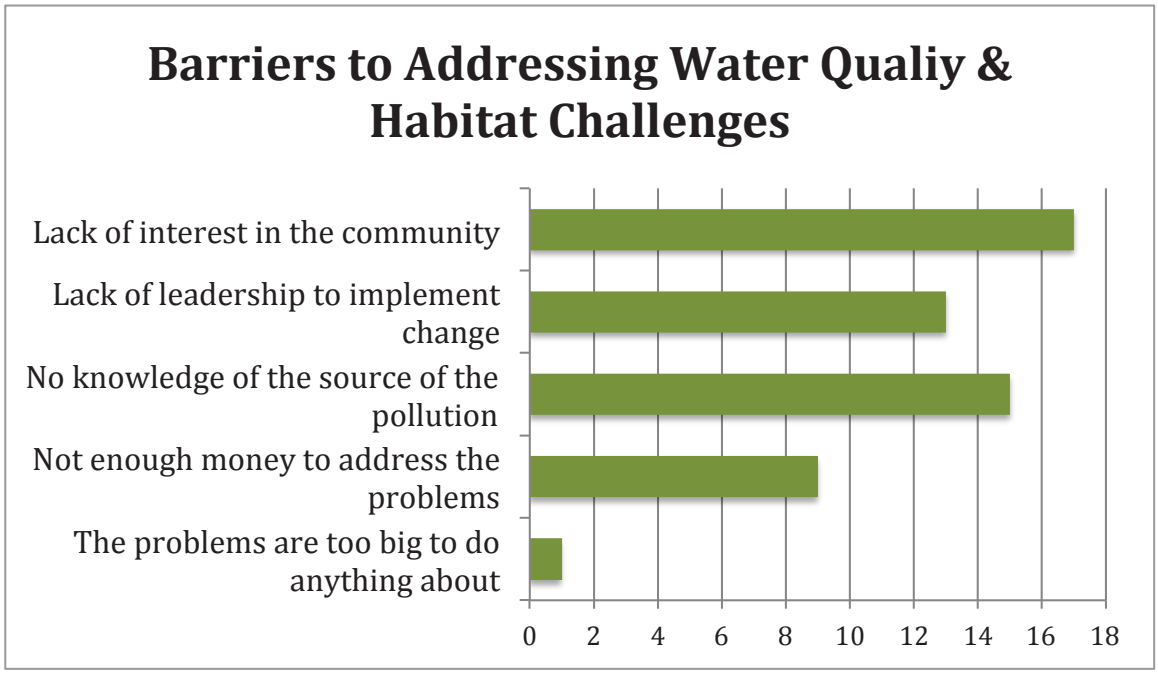


Figure 5: Public Input Survey - Barriers to Addressing Water Quality Challenges

The final two questions in the survey offer survey takers the opportunity to provide contact information for follow up opportunities and a blank space for additional comments. Three people elected to provide comments, all of which are positive and informative. These comments are as follows:

> "I am glad to see this effort. I think there are a lot of opportunities to improve water quality without negatively impacting farmers."

> "The river should be cleared and shored up, riverbanks stablized [*sic*], from Dillard/Rabun Gap area north to Franklin, thus allowing river to flow more quickly and freely cleaning itself and creating a more visual pleasing presence. River should be tested north of Rabun Gap/Dillard for runoff from agr. fields, wastewater treatment plants, individual sewage and pipes. Also sedimet [*sic*] control to keep erosion runoff out of river, which runs red at every little rainfall."

> "I have fished the watershed from top to bottom for 50 years. I have personally witnessed the sandy bottoms of the large still pools littered with dead crawfish. The lower areas of the watershed have always been marginal for trout due to water temperature. I would like to know that proper environmental rules/concerns are being observed concerning crop and live stock [*sic*] farming."

In summary, the survey provided valuable opinions and ideas from a variety of perspectives and professional interests mostly representative of the watershed demographics. The survey is also successful at identifying concerns of the community and perceived barriers to addressing the water quality issues facing the Upper Little Tennessee River. It is a useful tool that informs not only the data collection process, but also the public education component of this plan.

A blank copy of the survey can be found in **Appendix B**.

Organization of Plan

This plan has been developed using the EPA's "*Handbook for Developing Watershed Plans to Restore and Protect Our Waters.*" Each of the EPA's required 9 Elements are identified in the section titles where they are discussed. A general overview of the watershed and the project area is provided for background and reference purposes.

During the planning process, the project area was broken down into 5 smaller areas from the headwaters to the GA/NC state line. In an effort to focus the planning process, tributary streams with a watershed area of one square mile or less were not evaluated. Tributaries are addressed as they enter the mainstem Little Tennessee, and are discussed starting from their headwaters to the confluence point. See Figure 6 for a map identifying these areas, which are described as follows:

Area 1: Wolffork Valley and Tributary Streams to the US 441 Bridge

Area 2: 441 – Mainstem and tributary streams (Black's Branch, Black's Creek and Jerry Branch) to the confluence of Betty Creek and the Little Tennessee River,

Area 3: Betty Creek Watershed and Tributary streams (Including Barker's Creek, Patterson Creek, and Sutton Branch)

Area 4: Area between the confluence of Betty Creek and the confluence of Mud Creek (including Darnell and Kelly Creeks)

Area 5: Mud Creek to the State Line (includes Mud Creek and Lamb Creek)

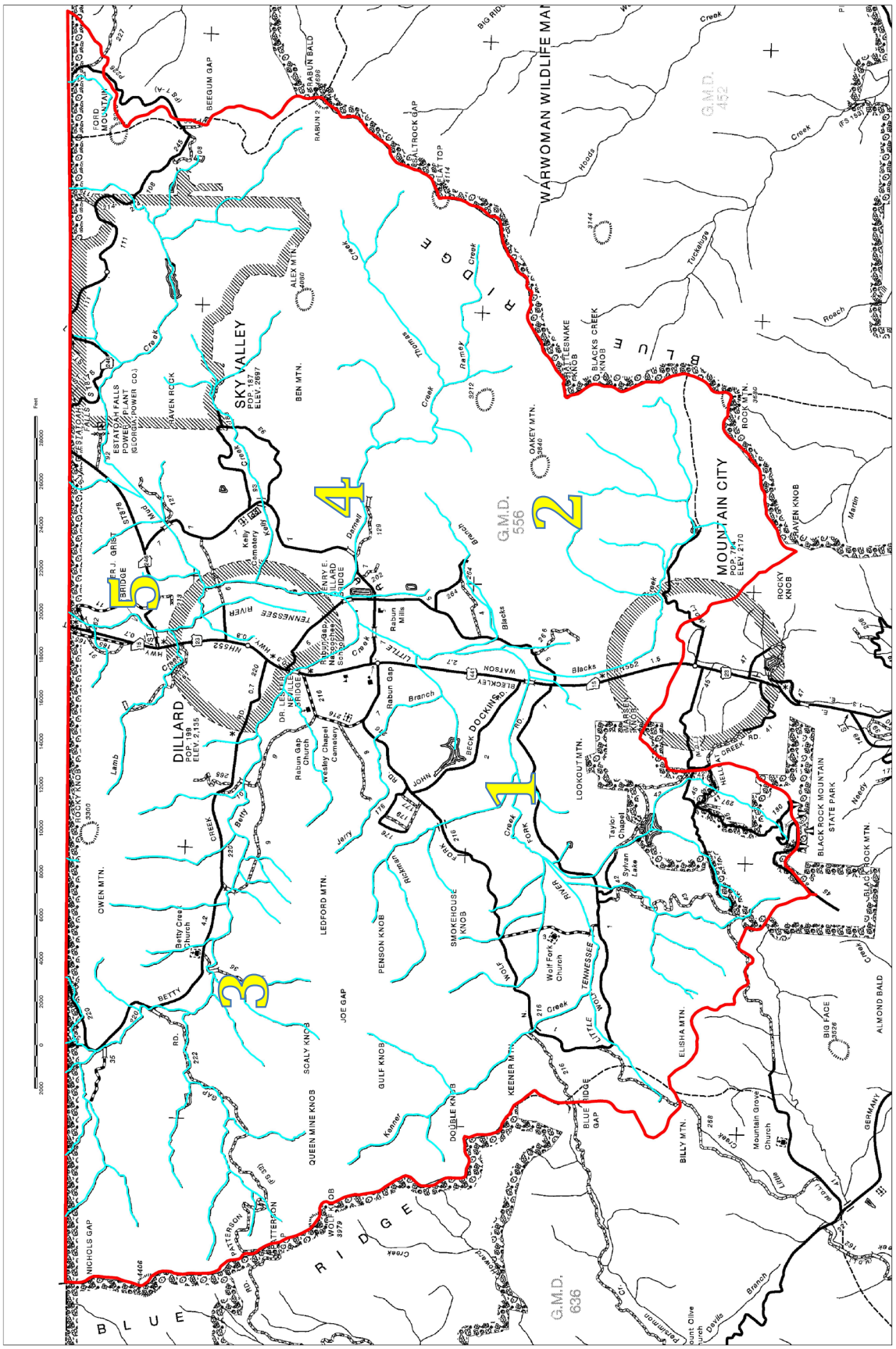


Figure 6: Map of the Project Area

Project Area Assessment

Physical Features

Geographic Location

The upper Little Tennessee River lies in the heart of the Southern Blue Ridge; one of the most biologically significant regions in the United States (TNC/SAFC 2000). The Little Tennessee River is a species-rich aquatic system, cited as perhaps the most ecologically intact portion of the seven-state Tennessee River system. Comprising just 2% of the greater Tennessee drainage, the free-flowing Little Tennessee is home to fully 1/4 of the native fish species of the entire Tennessee system. With habitats ranging from warm sheltered valleys to the highest mountain ranges of the eastern U.S., much of this diversity depends on the high quality of water that flows out of the mountains (LTWA 2011).

Figure 7: Tennessee River System Map, TVA

Flanked by the Chattahoochee and Nantahala National Forests, the headwaters of the Little Tennessee River originate near Mountain City, Rabun County, Georgia. The river is formed just past Black Rock Mountain State Park, where the Eastern Continental Divide separates the Tennessee and Savannah Rivers. The Little Tennessee River flows northward into North Carolina.

The Georgia portion of the Little Tennessee watershed includes a land area of 48 mi^2 and includes the cities of Mountain City, Dillard and Sky Valley. The mainstem Little Tennessee is first mapped as such in Wolffork Valley at the confluence of Keener and Billy Creeks. Keener Creek is listed on the Georgia Environmental Protection Division's (GA EPD) 303(d) list of impaired waters for biota and the mainstem Little Tennessee is

listed for fecal coliform pollution from downstream of the former Fruit of the Loom Facility (now housing the Development Authority of Rabun County) to the GA/NC state line.

After the confluence of Keener and Billy Creeks in Wolffork Valley, the Little Tennessee picks up additional tributary streams including Double Branch, Shop Branch, Pitt and Taylor Creeks and Rickman Creek. It then continues flowing east/northeast until it crosses under US 441. At US 441, Black's Creek enters the mainstem Little Tennessee as the river turns north. As it flows north, Black's Branch, Jerry Branch, Betty Creek, Darnell Creek, Kelly Creek and Mud Creek join the mainstem, in that order. Lamb Creek joins the Little Tennessee just before it crosses the state line between Georgia and North Carolina. Goldmine Creek is a small tributary right at the state line that drains to a wetland often referred to as the "Stateline Wetland." The project area ends at the GA/NC state line. See Figure 6.

Geology and Soils

The Upper Little Tennessee River lies in the Southern Section of the Blue Ridge Province of the Appalachian Highlands. The bedrock geology of this area consists of Precambrian metamorphic rock formations with a few small segments of igneous and sedimentary rocks. The dominant soil orders in this area are Inceptisols and Ultisols. Inceptisols soils are often found in mountainous areas and on steep slopes. Ultisols are reddish to orange clay-rich soils and are the dominant soil type in the Southeastern US. The well-known "Georgia red clay" moniker is a result of the Ultisol soils found in the area (Georgia Soil Survey).

According to NRCS Soil Survey information, the most common soil associations present in the project area are as follows, representing approximately 90% of the soils found there:

1. Toxaway-Transylvania: Toxaway silt-loam is found in the floodplains of the Upper Little Tennessee, and these soils are poorly drained and highly subject to flooding. Streambank erosion is common and slopes tend to be less than 2 percent, making these soils good for row crop production and woodlands.
2. Tusquitee-Edneyville-Porters: These soils are found at the base of slopes and on narrow ridge-tops. Generally well drained, wooded and stony, these soils are poor for farming and tend to erode easily. They are commonly associated with moderate and steep slopes.
3. Hayesville-Bradson-Tusquitee: With slopes ranging from 10 to 25 percent, these soils are found along broad ridge-tops and on the hillside of mountain plateaus. These soils are fine-sandy loams that drain well, making them susceptible to erosion.
4. Saluda-Ashe: These soils are found on moderately steep and steep mountainsides with elevations ranging from 1,800 to 4,500 feet. The soils are somewhat

excessively drained and well drained and are commonly stony soils. Together these soils comprise approximately 20% of the soils found in the project area.

Climate/Precipitation

Coweeta Hydrologic Laboratory is an experimental forest located near Otto, North Carolina, approximately 10 miles north of the NC/GA state line. Established in 1934, Coweeta's Long Term Ecological Research (LTER) is one of the oldest continuous environmental studies in North America. A network of climate and precipitation stations has been established at the station in order to facilitate forest hydrology and management studies.

According to this information, the average annual precipitation is generally about 70 inches per year with the lowest average rainfall occurring in October (4.49 inches) and the highest average rainfall occurring in March (7.43 inches). Note, however, that rainfall is slightly higher at Coweeta than other parts of the watershed. Temperature data from Coweeta suggest that January is generally the coldest time of year with a monthly average temperature of 38.3 degrees F. July is the warmest month of the year with an average monthly temperature of 71.5 degrees F. All reported years are used in the average calculations, and this information can be found online at the LTER website. See Figure 8 for annual minimum, maximum and mean temperature data from Coweeta LTER and Figure 9 for annual precipitation data.

In 1988, a comprehensive review and analysis of the first 50 years of climate data was completed. At that time, no significant trends in minimum and maximum annual temperature or distribution of precipitation were identified. In 2012, the next 25 years of data were analyzed and changes in key climate variables were identified. According to Coweeta's data, annual precipitation is becoming more variable with wetter wet years and drier dry years. In other words, an increase in drought severity has been documented along with more variable precipitation patterns resulting in an increase in high intensity rainfall events (Laseter et al. 2012).

Higher minimum annual air temperatures have also been documented, especially in summer months. Since the 1980s, mean annual air temperatures have also been increasing. See Figure 8 for a copy of long-term average annual, maximum and minimum air temperatures at Coweeta Hydrologic Lab.

Figure 8: Long-term Average Annual, Maximum and Minimum Air Temperatures at Coweeta Hydrologic Lab.

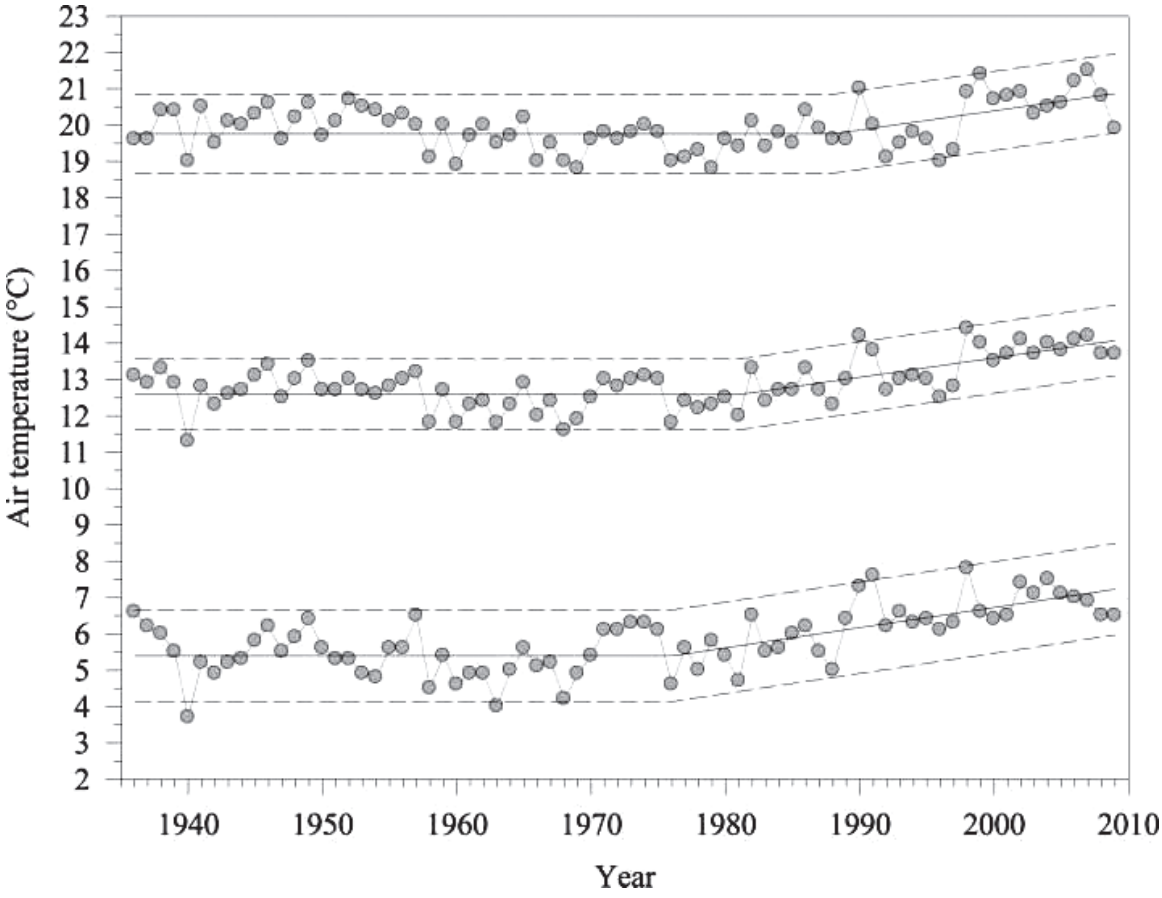
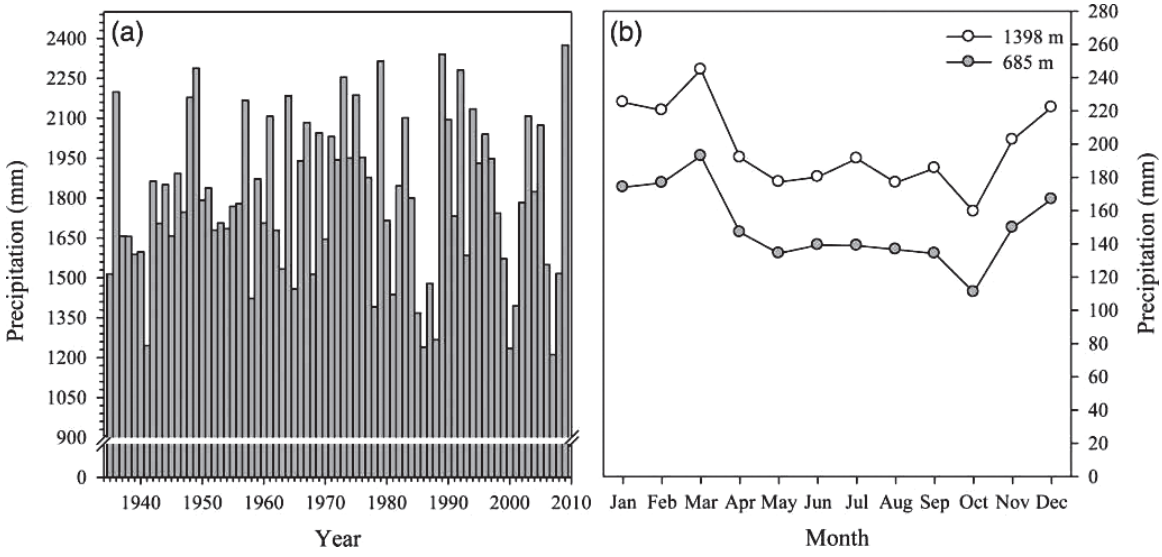


Figure 9: Total Annual Precipitation and Average Monthly Precipitation, Coweeta LTER



The freeze-free period (or growing season) in the project area averages 171 days and the average last frost date is April 28th (50% chance). The average first frost date is October 17th (Almanac.com).

Another weather station operated by the Georgia Automated Environmental Monitoring Network (AEMN) is located in nearby Tiger, Georgia, in the Chattooga River watershed (Savannah basin).

Table 2: Average monthly temperatures and rainfall from weather.uga.edu

Climate Averages

From 1911 to 2003 climate name GA22.CLI
Data for this station are from:
CLAYTON 1 SSW,RABUN, 34.867 deg N, 83.4 deg W,
elevation of 1879 feet or 573 m.

Time Period	Average Maximum Temperature (°F)	Average Minimum Temperature (°F)	Total Precipitation (in)	Number of Rainy Days
Jan	51.1	29.1	6.66	11
Feb	54.3	30.4	6.18	9
Mar	61.2	35.6	7.29	11
Apr	70.2	42.8	5.59	9
May	76.6	50.7	5.50	10
Jun	82.6	58.3	5.45	11
Jul	84.9	62.1	6.20	13
Aug	84.0	61.3	6.09	11
Sep	79.2	55.8	5.33	9
Oct	71.1	44.8	4.75	7
Nov	61.0	35.6	5.33	8
Dec	52.7	30.2	6.58	10
Year	69.1	44.7	70.94	119

Although the weather station is outside the project area, this information was reviewed to compare climate trends identified in Coweeta's data. Total annual precipitation is approximately 71 inches with a total of 119 rainy days. Like Coweeta, Tiger Mountain is slightly rainier than the City of Clayton and other towns within the project area.

The average July high temperature is approximately 85 degrees F and the January low average is 29 degrees F. See Table 2.

The Tennessee Valley apparently surpasses all other area watersheds in terms of runoff - i.e. the amount of rainwater that reaches the river, according to *Valley So Wild: A folk history*. "The Little Tennessee has an average runoff of 2.3 cubic feet per second [cfs] per square mile, compared with 2 cfs for the Hiwassee, 1.5 for the French Broad and Clinch and only 1.2 for the Holston" (Brewer 1975).

Hydrology

The upper Little Tennessee River drains generally north, away from the Eastern Continental Divide. The watershed is contained within the southernmost tip of the Blue Ridge Mountains. The United States Geological Survey (USGS) has identified the upper Little Tennessee River with the 10-digit watershed hydrologic unit (HUC) No. 0601020201.

There are approximately 10 instream impoundments (or groups of impoundments) and historic mill structures in the project area, including:

- Dickerson Mill located at Blue Ridge Gap Road on Keener Creek
- Sylvan Lake located on Pitt Branch
- Sylvan Lake Falls Mill located on Pitt Branch
- Black Rock Lake located on Taylor Creek
- Indian Lake located on a tributary to Jerry Branch
- Rabun Gap-Nacoochee School Lake, located in front of the school (not an instream impoundment)
- Barker's Creek Mill located on Barker's Creek at Hambidge
- Patterson Creek & Tributary Impoundments (3) located on Negro Branch, Shoemaker Branch and Patterson Creek
- Sky Valley Golf Course impoundments located on Mud Creek

This amounts to three in the Wolffork Valley area, one on Jerry Branch, four in the Betty Creek watershed, one at RGNS apparently not in-stream but in the Betty Creek watershed, and several in the Mud Creek watershed. There are no instream impoundments on the mainstem Little Tennessee within the project area. The first named dam to impound the mainstem Little Tennessee is Porter's Bend Dam, which creates Lake Emory, located in Franklin, North Carolina. The long section of free-flowing stream extending from Lake Emory upstream along the Little Tennessee River and into major tributaries in Georgia is valuable for the persistence and long-term recovery of aquatic communities. This connectivity supports normal life-cycle movements (e.g., spawning migrations) but also allows for colonization and recovery after local extinction events.

The waterwheel located on Keener Creek is situated just below a natural barrier, just downstream of the USFS boundary. This mill is no longer operated. The Sylvan Lake impoundment is managed and maintained by the Sylvan Lake Falls Home Owner's Association for aesthetic purposes. The Sylvan Lake Falls Mill is now a Bed and

Breakfast and the gristmill is operated for small quantity grain milling. Black Rock Lake is located at Black Rock State Park and is managed by Georgia State Parks.

The four Betty Creek impoundments are located very close to one another. The first is located on an upper tributary to Betty Creek, on Barker's Creek. Barker's Creek Mill operates intermittently as a historic mill providing demonstrations once a month.

The next impoundment is located on Negro Branch, a tributary to Patterson Creek, on private property where it is suggested that the first rainbow trout hatchery in the County was created around 1920. This unique system diverted water into a small channel to feed the ponds so as not to impede native fish migrating upstream. The landowner has since drained the ponds (due to structural issues with the dam) and returned the stream to entirely natural flows. A waterwheel present at the site was used to generate electricity from approximately 1920-1940 (Interview with H. Meadors, unreferenced).

The tributary stream located to the north of Negro Branch is Shoemaker Creek, and another larger impoundment exists there to create a small pond, which is also located on private land. From there, the two tributaries merge together to form Patterson Creek, and a vacation rental facility has created a series of small impoundments with water features.

There are also a number of small impoundments at the Sky Valley Golf Course in upper residential areas with one large impoundment in the middle of the development called Sky Valley Lake. All of these impoundments are located in the upper Mud Creek watershed, just upstream of Mud Creek Falls and approximately 0.85 miles upstream of Estatoah Falls, a natural barrier.

Municipal water withdrawals for the Rabun County Water and Sewer Authority plant located at the former Fruit of the Loom facility are made in-stream and do not require a reservoir. Both the Dillard and Rabun County wastewater treatment plants have treatment ponds that are located adjacent to the Little Tennessee River.

The upper Little Tennessee River leaves Rabun County and flows through Macon and Swain Counties in North Carolina before being stilled by a series of five large dams extending into the State of Tennessee.

Fisheries

Many species that have disappeared from other river basins continue to thrive in the Little Tennessee. The basin provides habitat for a large diversity of aquatic life, including a number of rare fish, mussels, amphibians and insects—several of which are endemic. Implementation of this plan to improve the headwaters of the Little Tennessee River will not only address localized water quality problems, but also improve water quality for sensitive species found downstream.

The Little Tennessee watershed will be recognized as a high priority watershed in Georgia's State Wildlife Action Plan (GADNR 2005), which is undergoing a revision that will be completed in 2015. Georgia's high priority watersheds were further prioritized according to the number and global rarity of high priority species they contain

(Albanese et al 2015). By this measure, the Little Tennessee watershed ranks 32 out of 366 watersheds in the state.

This watershed was designated by technical team experts because it contains important populations of five high priority fishes: fatlips minnow (*Phenacobius crassilabrum*), silver shiner (*Notropis photogenis*), greenfin darter (*Etheostoma chlorobranchium*), olive darter (*Percina squamata*), and Tuckasegee darter (*Etheostoma gutselli*). All but the Tuckasegee darter are protected under Georgia's Endangered Wildlife Act. In addition, the Little Tennessee crayfish (*Cambarus georgiae*) has been petitioned for listing under the U.S. Endangered Species Act (USESA).

Another petitioned species is the eastern hellbender (*Cryptobranchus alleganiensis),* an amphibian also known from the watershed. Brook trout (*Salvelinus fontinalis*) have been documented from Keener Creek, Rickman Creek (only on USFS lands), upper Darnell Creek, Black's Creek (USFS lands only) and in the North Carolina portion of the Betty Creek watershed. Brook trout are recognized as a high water quality indicator.

A rare fish species endemic to the Little Tennessee and Tuckaseegee watersheds, the smoky dace (*Clinostomus* sp.), is also found in the watershed. While the smoky dace is not listed, it has special designation as a "species of special concern" in Georgia, and the strongest populations are found in the Georgia portion of the watershed. More information on Georgia's protected species can be found at http://www.georgiawildlife.com/rare_species_profiles.

Improvements that come as a result of implementation of this plan will benefit species occurring in the mainstem Little Tennessee River in North Carolina as well, including the federally threatened spotfin chub (*Erimonax monachus*), two federally listed mussels, and an important population of the sicklefin redhorse (*Moxostoma* sp.), which is a candidate for listing under the USESA.

In 2013, the North Carolina Wildlife Federation initiated an effort to form a partnership to create the Little Tennessee Native Fish Conservation Area. Members of the partnership include the Sierra Club, the Tennessee Department of Environment and Conservation, Tennessee Wildlife Resources Agency, National Park Service, US Fish & Wildlife Service, NC Department of Environment & Natural Resources, NC Wildlife Federation, Trout Unlimited, TVA, American Rivers, Conservation Fisheries, Inc., Land Trust for the Little Tennessee, the Eastern Band of the Cherokees, GA Department of Natural Resources, NC Wildlife Resources Commission, and the US Forest Service.

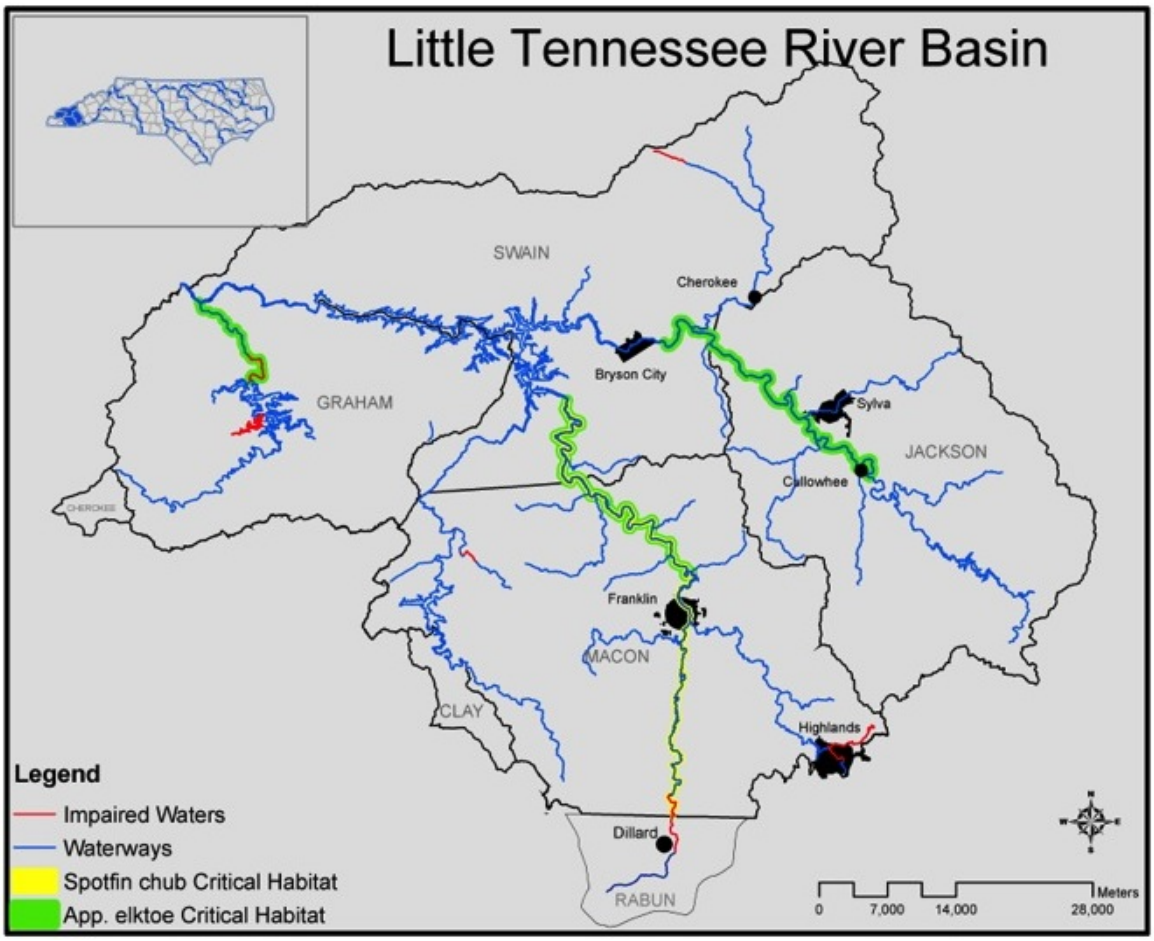


Figure 10: Upper Little Tennessee Critical Habitat Map. Angie Rogers, NCWRC

A Native Fish Conservation Area (NFCA) is a river basin managed for the conservation and restoration of native fish and other aquatic species, as well as compatible recreational and commercial uses. NFCAs involve a non-regulatory, collaborative approach to conservation that incorporates biological needs and local community values into river basin management practices. The formation of a Little Tennessee NFCA would treat the entire basin – from its headwaters in Georgia to its confluence with the Tennessee River – as one conservation area, with coordinated efforts to align management goals and aquatic habitat restoration activities among partners.

Habitat and Wildlife

According to the State Wildlife Action Plan, "Georgia ranks second among all states in amphibian diversity, third in freshwater fish diversity, seventh in reptile diversity, fifteenth in bird diversity, and seventeenth in mammal diversity."

The mainstem of the river between the GA/NC border and the Lake Emory Reservoir in Franklin, North Carolina is designated by the U.S. Fish and Wildlife Service (USFWS) as critical habitat for the spotfin chub. The mainstem Little Tennessee between Franklin and the Fontana Reservoir, located in Swain County, North Carolina, is designated critical

habitat for both the spotfin chub and the Appalachian elktoe (*Alasmidonta raveneliana*) mussel, which is also federally listed. See Figure 10 for a critical habitat map.

Figure 11: White Trillium (*Trillium Grandiflorum*)

In Georgia, the mainstem Little Tennessee and its tributaries are all designated as primary trout stream waters except for the portion of the mainstem between US 441 and the GA/NC state line, which is designated as secondary trout stream habitat. Mud Creek from Sky Valley down to the confluence is also designated as secondary trout waters.

According to National land use/land cover data for the upper Little Tennessee, a little over 40% of the watershed is National Forest and State Park land and/or conservation lands. Most of the tributary streams in the project area originate on USFS lands, with Taylor Creek originating in Black Rock Mountain State Park. Mountain streams flowing from these areas tend to be rocky, steep, cold and completely forested. The relatively deep mountain soils act as sponges, trapping much of the abundant rainwater and slowly releasing this water to feed these headwater streams. Other notable habitat features of the watershed include waterfalls, rock outcrops, mountain bogs, and wetlands.

The north-south orientation of the upper Little Tennessee River valley provides a spring and fall migratory corridor for numerous bird species. In addition to being a key natural flyway due to its topography, the valley provides all the requirements necessary for these birds in regard to food and stopover habitat: woodlands for warblers and other passerines; and pools, sandbars, mud flats, and wetlands for waders, shorebirds, and waterfowl.

Forests in the project area include species such as yellow-poplar *(Liriodendron tulipifera)*, white basswood *(Tilia heterophylla)*, sugar maple *(Acer saccharum)*, yellow and sweet birch (*Betula alleghaniensis and Betula lenta*), cucumber magnolia *(Magnolia acuminate*), yellow buckeye (*Aesculus flava*), black cherry (*Prunus serotina*), eastern hemlock (*Tsuga canadensis*), white ash (*Fraxinus americana*), black gum (*Nyssa sylvatica*), american beech (*Fagus grandifolia*), red maple (*Acer rubrum*), and various

oaks and hickories (GADNR 2005). Some of the wildlife found within the project area includes black bears (*Ursus americanus*), ruffed grouse (*Bonasa umbellus*), whitetail deer (*Odocoileus virginianus*), North American beavers (*Castor canadensis*) and timber rattlesnakes (*Crotalus horridus*). Wildflowers, lichens and a variety of shrubs, forbes and sedges thrive here, some of which are considered rare, threatened or endangered at the state and federal level. Mountain doghobble *(Leucothoe fontanesiana)*, trillium (*Trillium* L.), silky dogwood (Cornus amomum), alder (*Alnus serrulata*), flame azalea (*Rhododendron calendulaceum*), and lady slipper orchids (*Cypripedium parviflorum*) are commonly found in the project area.

One of the most important habitat features of the project area is the presence of wetlands and mountain bogs that provide habitat for the bog turtle (*Glyptemys muhlenbergii*), which is listed both in Georgia and federally as threatened. A wetland located at the GA/NC state line (often referred to by local resource professionals as "the state line wetland"), which is owned by Rabun Gap-Nacoochee School, was recently placed in permanent protection by LTLT. The wetland was formed in an old channel of the river and it is estimated to be the largest wetland in the Georgia portion of the watershed. It contains rare flora and fauna and conservation of this important habitat will benefit both aquatic and terrestrial species.

Some of the most critically endangered habitats of the Southern Appalachian Mountains are bogs, which are "swampy" areas that stay wet most of the year. Referred to as "biotic treasures to be preserved at all costs for their scientific and educational value," bogs provide habitat for carnivorous plants, mosses and other rare species (Wharton 1978). There are at least two mountain bogs in the project area. Both are important because they are less disturbed than most other bogs in the state and offer researchers a chance for long-term study (Kruse 2012).

Land Use, Economy and Demographics

Cultural History and Historic Land Use

The Little Tennessee valley is the homeland of the Cherokee. The headwaters of the upper Little Tennessee, Tuckaseegee and Hiawassee Rivers were home to the Cherokee Lower Towns, Middle Towns and Over Hills Towns (LTNPST 2008). Remnants of Native American mounds are documented in at least two sites in Dillard, GA, with one located in the floodplain of the Little Tennessee River above the river's confluence with Kelly Creek (Interview with M. James, undocumented). This and another mound known as "Hoojah Branch" are actually thought to be from an earlier mound-building Native American culture known as Mississippian people. Hoojah Branch is located approximately one mile east of Dillard along Darnell Creek, in the Chattahoochee National Forest, and it is listed on the National Register of Historic Places (Roadside Georgia 2015).

In 1775, when William Bartram made his way through Courthouse Gap into the Little Tennessee River valley, he describes abundant strawberry fields dotting the floodplains

and "incredibly fertile" soils. Entering the valley at Black's Creek, Bartram describes "riding several miles over very rough, stony land" and presumably upon seeing Wolffork Valley describes it as follows: "when the high mountains on each side suddenly receding, discover the opening of the extensive and fruitful vale of Cowe, through which meanders the head branch of the Tanase, almost from its source, sixty miles, flowing its course down to Cowe" (Harper 1978). "Tanase" is "Tennessee" and "Cowe" references the Cowee Community of the Little Tennessee River in Franklin, North Carolina. Cowee was the central town of the Cherokee.

According to *Valley So Wild: A folk history,* it was nearly two decades after settlers came to the lower Little Tennessee River before Rabun Gap lured more permanent residents. Some of the very first white settlers in the area were Revolutionary War veterans who were given land grants as a reward for their service during the war, believed to have come around 1785. Rabun County was named for William Rabun and was formed after the State of Georgia officially removed the Cherokees in 1819 and gave the rest of the land to white settlers in a land lottery (Rabun County Historical Society 2015). The 1820 census listed 524 people in Rabun County (Ritchie 1948).

The Little Tennessee valley was situated in district two of five land districts created for the lottery, and land lots here were 250 acres each. Land lots in other parts of the county were 490 acres each. A person could enter the land lottery for $18. In the 1820s land sold for approximately $1 per acre and some lottery winners immediately sold their land for profit. Around this time the Dillard Family acquired 1,000 acres and formed present-day Dillard, Georgia (Brewer 1975).

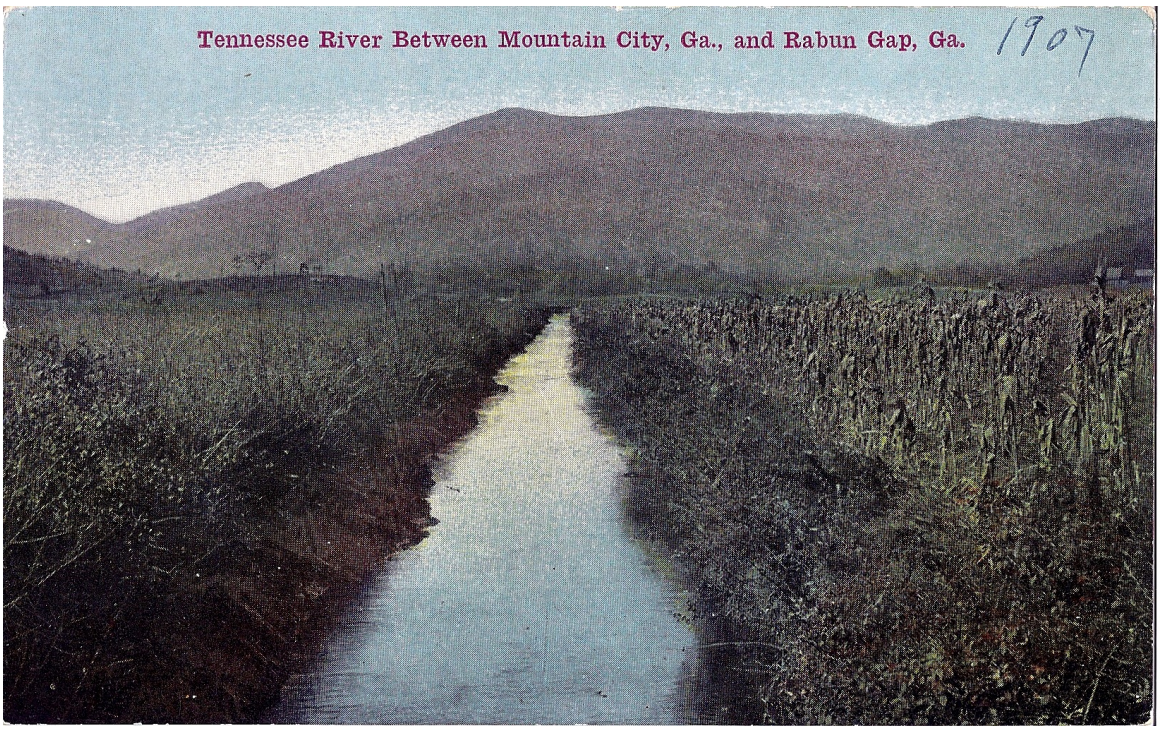


Figure 12: Postcard depicting the Little Tennessee in 1907, courtesy of Prater's Collectibles

After the Cherokee were removed and more settlers moved into the valley, accelerated land clearing changed the landscape dramatically, with major timber harvesting occurring into the early part of the 20th Century. This was compounded by the expansion of the Tallulah Falls Railroad through the area around the 1900s. It is likely that some of the observed channelization in the mainstem Little Tennessee occurred during early agricultural development of the valley and also during the construction of the railroad.

Over logging in the area resulted in sedimentation, and the sediment covered spawning beds in creeks and streams. Overfishing by loggers and settlers further reduced spawning stock. Denuded forestland impacted wildlife habitat, and hunting pressure wiped out deer populations and other fauna. In the 1930s, large blocks of this impacted terrain were purchased by the U.S. Forest Service for the creation of National Forests, and the area was replanted with trees and restocked with various impacted game species (Wynn 1990).

The Rabun Gap/Wolffork Valley area has always been the center of farming in Rabun County because of its relatively flat topography, formed by the natural gap of the Blue Ridge Mountains and the Little Tennessee River valley. Reviews of historic and present-day USGS topographic maps illustrate channelization and draining of tributaries and low-lying wet areas over time, likely in an effort to convert these areas to agricultural lands.

Current Land Use

Despite the pressures of early development, the Little Tennessee remains relatively healthy. However, over the past decade the valley has experienced steady population growth and land use change due to its location within 300 miles of some of the fastest-growing cities in America including Charlotte, Raleigh, Atlanta and Nashville. This growth has triggered further conversion of forestland to impervious surfaces resulting in generally higher flood levels and increased stream velocities that are more damaging to infrastructure and stream stability.

Dr. Brett Albanese with the Wildlife Resources Division of the Georgia Department of Natural Resources provided an analysis of land use and land cover data completed for the 2015 Revision of Georgia's State Wildlife Action Plan.

National Land Cover Data (NLCD) for 2011 indicates that the watershed maintains high total forest cover (76.1% Table 3), which primarily occurs in higher elevation areas and on U.S. Forest Service property (see Figure 13). Approximately 40% of the watershed is in Conservation Lands. Pasture/Hay is the second largest land cover type (10.2%) and borders all major streams in lower elevation areas. Total Developed Land is 10.1% of land cover and is comprised primarily of Developed Open Space (8.6%, e.g., grass lawns, parks, etc.) as opposed to development with higher amounts of impervious surfaces (1.5%, e.g., homes, retail development, etc.).

Developed areas are concentrated along US 441 and in the Sky Valley area. Cultivated Crops (1.0%), Herbaceous (1.1%), and Shrub/Scrub (1.0%) comprise the next largest land cover types, with all other land cover types (Barren Land, Open Water, Woody

Wetland, and Emergent Herbaceous Wetlands) representing less than 1% of watershed area.

A comparison of NLCD 2001 and NLCD 2011 indicates only negligible changes in land cover (Albanese et al. 2015). However, urban growth models predict additional urbanization along the US 441 corridor and near existing urban areas in 2020 and 2050 (Albanese et al. 2015).

As noted, agriculture (both pasture/hay and row crop agriculture) is prevalent within the project area, exceeding the total percentage of developed land. Rabun County is home to several commercial operations producing a variety of crops including hay, Christmas trees, fruit, vegetables, sorghum, poultry and beef. According to a 2009 Georgia Farm Gate Value Report, there are approximately 2,300 head of cattle, 250 goats, 140 horses and 120 sheep in Rabun County. There were two commercial chicken houses located in the project area when this project began, but one facility has since ceased operation and torn down its broiler houses. Both farms are located in the Wolffork Valley area, and the remaining poultry farm in operation contains eight broiler houses.

As previously mentioned, Wolffork Valley has a long history of agricultural land use. This area contains a large proportion of the project area's livestock, while the mainstem and tributary streams from Black's Creek to Mud Creek tend toward row crop agriculture more than livestock grazing. However, both types of agriculture exist throughout the project area. Details about specific locations and potential nonpoint source inputs from these activities are discussed further in the source assessment section of this report.

Table 3: National Land Cover Data 2011

2011 NLCD class	Hectares	Percent	
Open Water	13.6	0.1	
Developed, Open Space	1067.2	8.6	
Developed, Low Intensity	114.4	0.9	
Developed, Medium Intensity	55.7	0.4	
Developed, High Intensity	22.2	0.2	
		Total Developed Land	10.1
Barren Land	24.7	0.2	
Deciduous Forest	8859.9	71	
Evergreen Forest	409.6	3.3	
Mixed Forest	219.4	1.8	
		Total Forest Land	76.1
Shrub/Scrub	128.5	1	
Herbaceous	140.7	1.1	
Hay/Pasture	1271.3	10.2	
Cultivated Crops	120.9	1	
		Total Cropland	11.2
Woody Wetlands	21.5	0.2	
Emergent Herbaceous Wetlands	0.6	0	

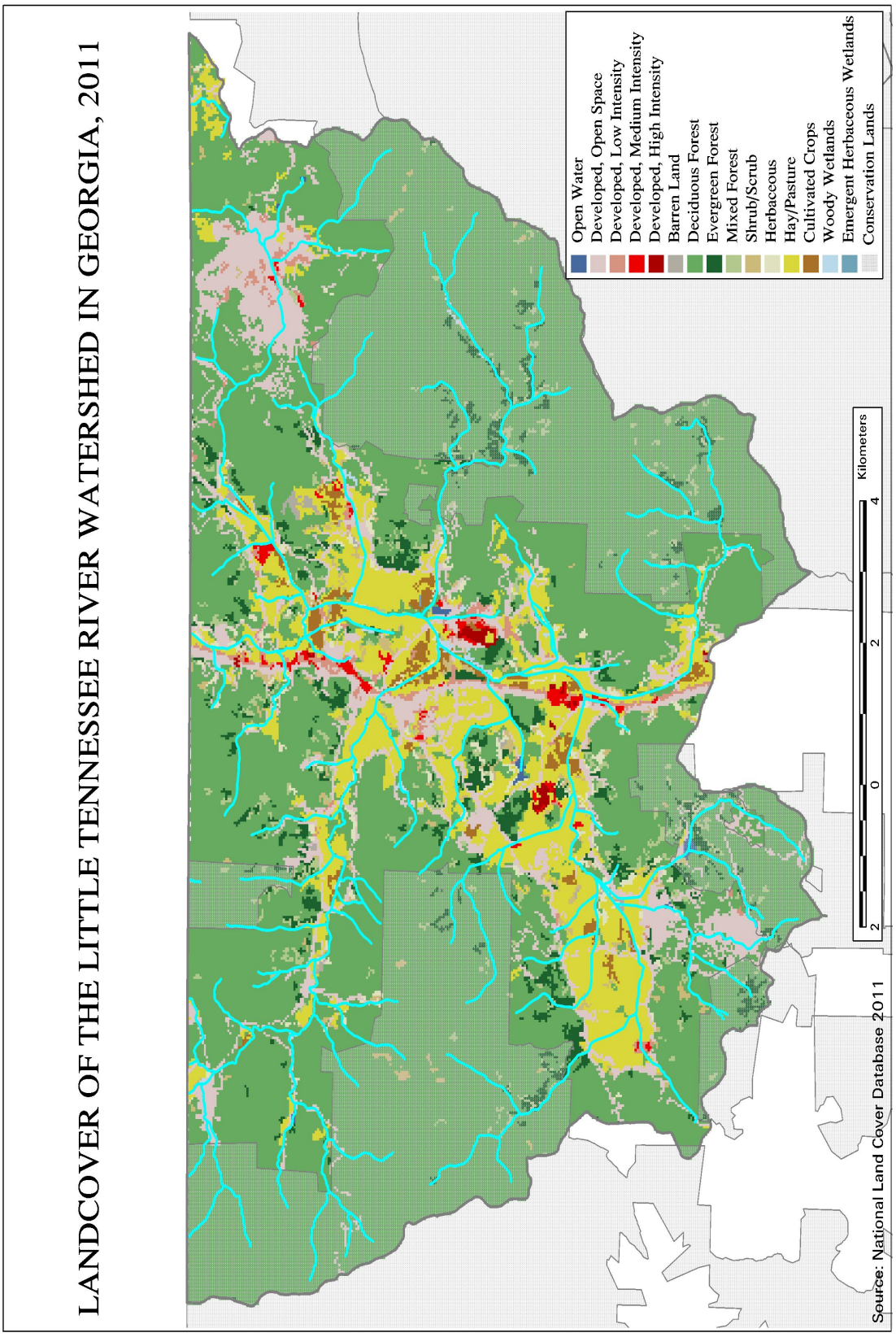


Figure 13: NLCD in the Little Tennessee River watershed, 2011.

Rabun County building permit application rates were also reviewed for the sixteen-year period from 1999-2014. New construction rates in Rabun County during this time peaked in the early 2000s, with an all-time high of 250 in 2003. From 2000-2006, the average number of building permits for new construction was 215 annually. The global financial crisis and the resulting recession in the U.S. reduced building applications to 159 in 2007 and then to 100 in 2008. New construction permits have generally averaged 40-45 per year since then, with one small uptick in 2011 related to tornado damage repair. The 2011 storm is reported to have destroyed at least 100 homes in the area. The change from the peak in 2003 to the current average of 40-45 permits annually since the 2007 recession amounts to an approximate 83% drop in new construction over that time. See Figure 14.

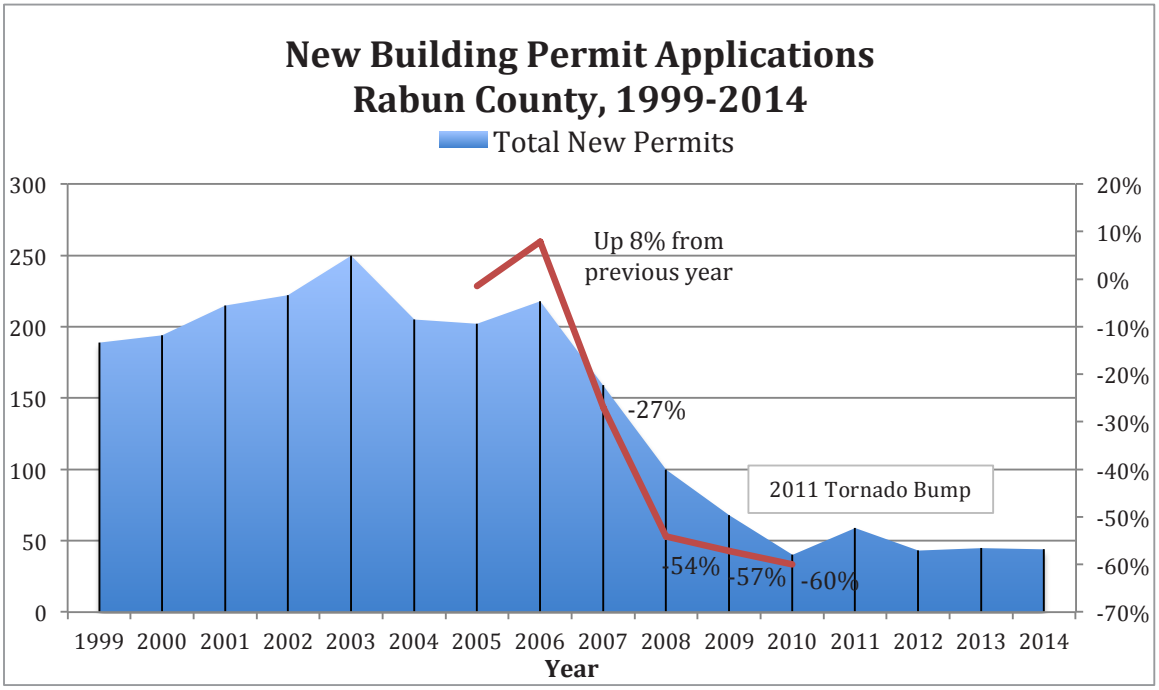


Figure 14: Rabun County Building Permits, 1999-2014.

The cities of Sky Valley, Dillard and Mountain City manage building permits within their jurisdiction, and the 2011-2014 permit information for Dillard and Mountain City was reviewed. Mountain City shows very little new development in this time with just two new home permits in 2011 and 2012, one in 2013 and zero in 2014. The City of Dillard has slightly higher statistics with 16 new construction permits during this same time. However, many of these permits were for porches, carports and sheds. The City of Dillard also reports a slight increase in permit applications in 2011 due to storm damage and tornados. Only two of the 16 permits from this time are for new buildings or home construction.

Economy & Industry

When Rabun County was created from Indian Territory in 1819, the area was remote and settlers were farmers out of necessity to survive. With the arrival of railroad service in Tallulah Falls in 1882, Rabun County became a tourist attraction for its natural beauty, and summer homes and boarding houses sprang up countywide. As electricity demands grew in the late 1800s, Georgia Power built dams in the rocky gorges of the southern part of the county to generate electricity, also bringing jobs to the area and creating a series of lakes that are now popular for recreation and second home developments.

In 1898, the Tallulah Falls Railway Company purchased the line and the railroad was expanded through Rabun County to Franklin, NC. This expansion lead to growth in the northern part of the county, bringing workers to the area and creating economic growth while providing jobs for locals (Prater 2012).

In 1903, the "Rabun Gap Industrial School" (now known as Rabun Gap-Nacoochee School) was established to help educate the isolated residents of the area. It was to be a place "where boys would be taught to farm and girls to cook and keep house" (Ritchie 1948). Since that time, the Rabun Gap-Nacoochee School has become one of the best-known and well-respected independent boarding schools in the southeast. It is currently one of the top ten largest employers in Rabun County (GA DOL 2015).

The first Agricultural Extension Agent was hired in 1915, known at that time as the "Canning Club Agent" (Ritchie 1948). Dillard Junior High School opened in 1927 and that same year, the Rabun Land and Water Company brought electricity to the northern part of the county (McKay 2003). Through the Great Depression the Civilian Conservation Corps (CCC) completed several projects across Rabun County, and the WPA set up the Rabun County Library in 1937 (Foxfire Fund, 2013). In 1940 the first birthing center opened in Rabun County and women shifted from using midwives at home (also known as "granny women") to modern care facilities (Wiggington 1970).

The first step toward an economy anchored in manufacturing came when a Hosiery Mill located one mile north of the City of Clayton opened sometime around 1948; reportedly the first modern textile factory in the county (Ritchie 1948). By 1977, manufacturing had become key in Rabun County, with 1,258 employed in the industry that year. Forestry was also a big economic driver. In 1972, 90% of the county was in commercial forest resource production, more than any other Georgia county in the Appalachian Region (Cassell et al 1980).

Through the 1970s, 80s and 90s manufacturing was a mainstay of the local economy, but Rabun County lost several of these companies in the early 2000s (GMRDC 2006). Two of the biggest facilities in the project area with a history of manufacturing include a plant located on John Beck Dockins Road along Rickman Creek in Wolffork Valley and a factory adjacent to the Little Tennessee River in Rabun Gap that now houses the Development Authority of Rabun County (DARC).

The site at John Beck Dockins Road was owned by Sangamo Energy, which produced electronics in the facility from approximately 1973-1985. Sometime around 1997, National Textiles (also known as Hanes) acquired the facility and began manufacturing yarn there. In 2009, Parkdale Mills purchased the property and is currently manufacturing yarn in the building.

The property located along the Little Tennessee River currently housing DARC is known locally as the "former Fruit of the Loom Plant" because Fruit of the Loom operated a manufacturing facility there until 2006. In 2005, just before the manufacturer closed its doors, it employed 920 people and was the largest employer in the county (GMRDC 2006). The DARC is now working to promote the building as a business park with ready-to-go manufacturing space to attract more industry to the area.

Prior to Fruit of the Loom, the building housed another textile manufacturing company, Rabun Apparel, who acquired the facility from Burlington Industries in 1992. Burlington was a carpet manufacturing company. According to records housed online in the EPA's Integrated Compliance Information System (ICIS), the facility has a history of manufacturing dating back to 1973. Documentation of manufacturing activities prior to 1973 at this facility was not found in the EPA database, but it is believed that manufacturing occurred there during the 1960s as well.

Early operations at this facility and the resulting effluent discharged into the river caused documented impacts to the biotic community. With the passage of the Clean Water Act and the implementation of an effluent permitting and monitoring system, habitat and fish communities began to improve. Additional improvements in habitat conditions and fish communities were observed when operations were temporarily suspended in 1992 and again in 2006. Dr. McLarney and others used this information to twice strengthen effluent permit limits for activities at the facility, and habitat conditions have continued to improve since 2006. Historically, this single facility has accounted for over 95% of total permitted industrial discharges for the entire watershed above the Fontana Reservoir in North Carolina, making it an important discharger to monitor.

While the economy diversified over time from primarily agricultural to an industrial and agricultural mix, Rabun County remained popular for its scenic beauty and the opportunities it offers for solitude in nature. Summer camps, golf courses, hiking and whitewater sports now lure visitors to the area annually. Whitewater rafting on the wild and scenic Chattooga River (in the Savannah River Basin system) has an economic output of about $4 million annually and trout fishing's annual impact in Georgia is estimated to "exceed $172 million annually" (LTWA 2010).

According to 2015 employment data provided by the Georgia Department of Labor and the Development Authority of Rabun County, the top employers in Rabun County (listed with largest employer first) include:

- Rabun County Government
- Rabun County School System
- Parkdale Mills
- Wal-Mart Supercenter
- Mountain Lakes Medical Center
- Ingles Market Inc.
- Tallulah Falls School
- Rabun Gap-Nacoochee School
- Dillard House
- Gap Partners, Inc.
- Reeves Hardware Co. Inc.
- Hillside Orchard Farms
- The Home Depot

Of the 6,616 people in the labor force in Rabun County, 6,160 are employed and 456 are unemployed. The resulting unemployment rate is 6.9%. (DARC and GA DOL 2015).

Population/Demographics

The 2013 US Census Bureau estimate of the population of Rabun County is 16,247, amounting to a 3.2% drop in population since 2010. Approximately one-quarter of the population is over the age of 65, which is not surprising given that Rabun County is a popular retirement and second home destination. The unemployment rate of Rabun County as of June 2015 is 6.9%, slightly above the US rate of 5.6% reported in December 2014. This is likely attributed the slow recovery from the 2007 economic recession compounded with the departure of two major manufacturing businesses shortly before.

Population estimates for the cities within the project area in 2013 are 339 for the City of Dillard, 1,062 in Mountain City and 269 in Sky Valley. The median household income of Rabun County residents from 2009-2013 is $35,423 with an estimated 21.5% of the population living below the poverty level during that time. The rural character and the lagging economy of the project area present a challenge for conservation efforts. It is important to propose management measures that will not reduce or hinder job growth while educating the public about the potential economic value of improved habitat and scenic beauty.

Water Resources and Waste

Drinking Water, Wastewater & Water Quantity

The Federal Water Pollution Control Act, more commonly known as the Clean Water Act (CWA), is the basic federal law for controlling water pollution in the United States. In 1972, a series of amendments to this law overhauled the entire water pollution control

system. The CWA prohibits the discharge of any pollutants into "waters of the United States" unless the polluter has a permit issued under the CWA.

The United States Environmental Protection Agency (EPA) is charged with the overall administration of the CWA. In Georgia, the DNR Environmental Protection Division (EPD) is the agency charged with issuing permits to industries and municipalities. The National Pollutant Discharge Elimination System (NPDES) is a permit-based program designed to regulate the discharge of pollutants into U.S. waters. Section 402 of the Clean Water Act prohibits the discharge of any pollutant from a point source into navigable waters of the United States unless the discharger has an NPDES permit.

There are two types of NPDES permits: municipal or industrial wastewater and stormwater permits. According to the USEPA's Envirofacts website, there are three active NPDES wastewater permits in the Upper Little Tennessee project area. Two are municipal wastewater operations belonging to Rabun County and the City of Dillard. The third is an NPDES permit for the Rabun Gap rock quarry operated by the Vulcan Materials Company. According to Vulcan representatives, the quarry operates a closed loop system and rarely discharges under its NPDES permit. No violations were documented in EPA's database in recent history for Vulcan's permit.

The two municipal NPDES permit records show recent violations. The City of Dillard reported a fecal coliform limit violation in the third quarter of 2014. The Rabun County WWTP reported violations during Q1-Q3 of various parameters including biochemical oxygen demand (BOD), temperature and phosphorus. A summary list of this information can be found in Table 4 below. See compliance history charts from EPA's Envirofacts website in **Appendix C**.

Table 4: Active NPDES Permits in the Upper Little Tennessee Project Area

FACILITY INFORMATION	Lat	Long	NPDES ID	Permit Issue Date	Permit Expire Date	Recent Compliance History
RABUN COUNTY WRF 1650 YORKHOUSE ROAD RABUN GAP, GA 30568	34.944629	-83.382068	GA0039152	09/17/09	08/31/19	In Violation Q1-Q3 2014
VULCAN MATERIALS CO. RABUN GAP ROAD RABUN GAP, GA 30568	34.953596	-83.376782	GA0023787	06/30/77	03/30/15	In Compliance
DILLARD (CITY OF) WPCP GREENWOOD LANE DILLARD, GA 30537	34.978148	-83.381353	GA0047139	12/01/91	06/01/15	In Violation Q3 2014

Water quantity and the issue of interbasin transfers (IBTs) via NPDES discharges has been a concern for many stakeholders in and around the project area for several years. An interbasin transfer occurs when water is permanently removed from one river basin and deposited into another river basin. This usually occurs when water is pumped out of a river system to provide potable drinking water services, and then treated and discharged into another river basin at a wastewater treatment facility.

Interbasin transfers are a problem because stream flow is tied to groundwater levels. When a river is consistently low, either due to drought or interbasin transfers (or both), it begins to attract groundwater to provide a base flow. Cumulatively, this can lower the water table, which is water stored underground. When this happens wells can run dry, ponds and lakes can dry up, etc. Extended low water also poses a problem for aquatic species and recreational users.

Conversely, increased flow in a river due to an interbasin transfer *into* the system can also create problems. Sustained increase flow can cause FEMA floodplain maps to become obsolete more quickly and can contribute to increased incidence of flooding if base flow levels are permanently increased by the additional water being transferred into the watershed from outside sources. Currently, interbasin transfers into the Little Tennessee basin are occurring from the City of Clayton's treatment plant. Water from the Savannah River basin is being pumped into the Little Tennessee basin as potable drinking water. Stakeholders are concerned that allowing this practice to continue will create a situation where water may one day be pumped out of the Little Tennessee to serve outside communities, especially if a perceived "surplus" of capacity exists.

There is currently one provider in the ULT plan project area for potable drinking water: the City of Clayton. Clayton buys water from Rabun County's Water and Sewer Authority and distributes it to Tiger, Clayton, Mountain City and some areas of Dillard. The water is withdrawn from Lake Rabun, located in the Savannah River basin. Water is pumped over the Eastern Continental Divide to Mountain City and Dillard. This results in an interbasin transfer of water into the Little Tennessee River because this water is used and then discharged into the Little Tennessee River as treated wastewater.

The City of Clayton also has an active 0.7 MGD water withdrawal permit on Black's Creek in Mountain City (in the ULT Plan project area) but the plant is not currently functional and there are no plans to bring it up to date. All other water users in unincorporated areas who are not provided water by the City of Clayton are using private wells. The City of Sky Valley provides water to its residents via six municipal groundwater wells that are each approximately 250 ft. deep, providing approximately 0.3 MGD. The City also holds a 0.25 MGD surface water withdrawal permit for Mud Creek, but it is not utilizing that water.

With the closure of the Fruit of the Loom facility, Rabun County leaders sought to purchase the property in order to acquire and convert the active wastewater and water withdrawal permits from industrial use to municipal use.

In 2007, Rabun County bought the 900,000+ square-foot building and the surrounding land, complete with the water and wastewater treatment permits and facilities. In 2009, Rabun County successfully applied for and received permission from the GA EPD to upgrade the wastewater treatment permit at the plant from industrial to municipal. This is the plant that is referred to as the "Rabun County WRF" in Table 4. This facility discharges into the Little Tennessee at the start of the area designated as impaired for fecal coliform pollution.

Rabun County is now in the process of upgrading the water treatment plant at that site and converting the industrial water withdrawal permit to a 1.5 million gallon per day (MGD) municipal permit, with plans to eventually up it to 3 MGD. The current industrial permit is for 3 MGD, but municipal withdrawal permits have to show a demand for the requested withdrawal amount before they can be permitted. This is an important IBT protection measure so that "excess capacity" is not permitted in advance of a community's need, which could tempt some communities to sell the water outside of the intended service area. The stated purpose of the water withdrawal permit is to service the northern end of the County – i.e. the ULT Watershed Management Plan project area.

Once completed, this move should reduce and perhaps end IBTs into the watershed from the City of Clayton's water lines and the Savannah River basin. Rabun County Commissioners stated their intentions to limit IBTs and protect the citizens of Rabun County from unwanted out-of-county water grabs and IBTs in 2011 through Resolution 2011-01, found in **Appendix D**. Rabun County has formed a combined Water and Sewer Authority. Municipal permit holders in the county are in the process of shifting all water and wastewater management over to this entity.

Some residents within the project area and downstream residents in North Carolina have expressed concern over the possibility of water from the Little Tennessee being sold off as an IBT to larger metropolitan areas such as Atlanta. This issue came to the forefront in 2007-2008 as Atlanta faced a court-mandated deadline to either comply with permitting requirements or find an alternative water supply to Lake Lanier. For now ample rain and conservation efforts have eased the urgency of that particular issue, but stakeholders should continue to urge lawmakers not to sell Rabun County's water supply to any neighboring urban center, which would ultimately sacrifice the community's ability to grow.

Dillard currently operates a municipal wastewater treatment plant with a discharge point located less than a quarter of a mile downstream from the Rabun County WRF. The treatment system utilizes oxidation ponds and treated effluent is discharged into the Little Tennessee River. Dillard is permitted to discharge up to 200,000 gallons a day (0.2 MGD) into the same stretch of the Little Tennessee River as the Rabun WRF, and this stretch is listed as impaired for fecal coliform pollution. Dillard is in the process of expanding and upgrading its sewer collection lines.

The City of Clayton currently provides wastewater treatment to the towns of Clayton, Mountain City, and Tiger with a permitted discharge of up to 1 MGD into the Savannah River Basin. The County's goal is to eventually transfer all water and wastewater permits and operations over to the Authority to manage.

Figure 15: The City of Dillard's Wastewater Treatment Plant.

In 2008, Georgia adopted a State-wide Comprehensive Water Management Plan in part to address the ongoing water dispute between Georgia, Alabama and Florida. The plan established Regional Water Councils to draft specific plans for each of the ten regions created by the State-wide Plan. Since the Little Tennessee is closest to the Savannah-Upper Ogeechee Water Planning Region, it was included in this committee's plan. The Council's Initial Recommended Regional Water Plan was produced in 2011.

One of the topics that the plan addresses is forecasting future water and wastewater needs of each county within the region. According to the Council's report, all of the active municipal water withdrawal permits in Rabun County have a combined capacity of 4.8 MGD, but that includes the Black's Creek permit, which is apparently out of service indefinitely.

Table 5: Copy of table predicting water needs from the Savannah Upper-Ogeechee Water Plan

Municipal Permitted Water vs. 2050 Forecasted Demand (MGD) [1,2]				
County	Current Permitted Water Withdrawals [3]	Projected 2050 Water Demand [3]	2050 Permitted Capacity Need	Additional Capacity Available
Banks	1.0	1.9	0.9	None
Burke	5.4	2.6	None	2.8
Columbia	40.2	45.1	5.0	None
Elbert	5.4	1.4	None	4.0
Franklin	7.4	6.0	None	1.4
Glascock	0.0	0.0	None	0.0
Hart	3.5	6.1	2.6	None
Jefferson	3.3	1.4	None	1.8
Jenkins	1.0	0.8	None	0.2
Lincoln	1.0	0.7	None	0.3
McDuffie	3.5	5.9	2.4	None
Madison	0.6	5.1	4.5	None
Oglethorpe	0.3	4.2	3.9	None
Rabun	4.8	4.4	None	0.4
Richmond	80.5	73.1	None	7.4
Screven	1.5	1.7	0.2	None
Stephens	15.0	6.6	None	8.4
Taliaferro	0.0	0.0	None	0.0
Warren	0.8	0.6	None	0.2
Wilkes	3.8	2.4	None	1.4

The plan summarizes the following details to estimate water capacity in the county: the Combined Water and Sewer Authority's active water withdrawal permits total 3.5 MGD with 2.0 MGD from Lake Rabun and 1.5 MGD from the former Fruit of the Loom plant permit. The City of Clayton's Black's Creek permit (in the project area) is 0.7 MGD. The City of Sky Valley has 0.3 MGD in active municipal wells and another 0.25 MGD for Mud Creek that is not currently in use. This totals a potential capacity of 4.75 MGD, but it would be more accurate to estimate a capacity of approximately 4.0 MGD, removing the City of Clayton's 0.7 MGD for the Black's Creek plant.

The Council projects a 4.4 MGD demand for 2050 that leaves a shortfall of approximately 0.4 MGD with current permitted withdrawals, excluding the Black's

Creek capacity. Rabun County's intent is to upgrade its permit on the Little Tennessee River from 1.5 MGD to 3.0 MGD when the need is justifiable in the service area. See a copy of Table 5-4 from the Savannah-Upper Ogeechee Initial Recommended Regional Water Plan, detailed as Table 5 in this report.

Stakeholders should continue to monitor water withdrawal permit activity and stay in communication with Rabun County and the Water and Sewer Authority to encourage the reduction or elimination of IBTs except for emergency situations that require short-term transfers of water between basins.

The Council also analyzed future wastewater needs, but the 2050 model assumptions appear to be inaccurate. The plan assumes a 2011 permitted municipal wastewater discharge capacity of 2.2 MGD with 2.0 MGD from Clayton's permit and 0.2 MGD from Dillard's. However, as previously mentioned the former Fruit of the Loom facility was successfully converted to a 3.0 MGD municipal permit in 2009. The projections also assume an increase in capacity for the City of Dillard's plant from 0.2 MGD to 1.0 MGD, but no expansion is currently planned. Even accounting for these corrections, this leaves a current permitted capacity of 4.2 MGD, which is also just under the Council's original estimated capacity.

As previously stated, the actual current discharge capacity permitted to the City of Clayton is 1.0 million gallons per day into the Savannah River Basin. The City of Dillard holds a 0.2 MGD discharge permit. Combined with the Rabun WRF's 3.0 MGD, this totals approximately 4.2 MGD currently permitted. The plan's forecasted wastewater discharge need for Rabun County by 2050 totals 3.1 MGD, so the current permitted capacity appears to be more than adequate for the foreseeable future. With the majority of the County's treatment capacity located in the northern part of the county, it will be important for project stakeholders to stay in communication with County officials and Water and Sewer Authority representatives to encourage adherence to the County's stance on ending IBTs.

Septic Systems

Areas not served by municipal lines, mostly locations in the unincorporated areas of the county, are served by septic systems. The Rabun County Health Department's Environmental Health Division has been working closely with landowners to identify problem septic tanks and repair them quickly. They are also in the process of developing an electronic permit tracking system and soon plan to be able to provide coordinates and geographic information services (GIS) maps of septic tank locations. This mapping project should be completed in 2016.

The Comprehensive Plan states the following about septic systems:

> "While septic systems are appropriate for many areas, variables such as soil type, soil depth, and slope angle affect the absorption and filtration capability of septic tanks and drain fields…the functioning ability of septic systems is generally acceptable to a slope of 25 percent. Between 25 percent and 35 percent slope,

modifications are necessary to ensure the system's functioning ability. In general, the western and northern sections of the County are most impacted by steep slopes. These locations include areas surrounding the Tennessee Valley Divide and the area between route 76 and Lake Rabun. The Georgia Human Resources Division of Public Health discourages the placement of septic systems on slopes greater than 35 percent."

The TMDL written for the mainstem Little Tennessee River in January 2004 notes that the number of septic systems installed from 1990 to 2001 is 4,150 with another 294 having been repaired during that time. Until the health department is finished updating their records to electronic format, an exact number of systems installed from 2002 until now is unavailable. However, assuming even the same rate of installation over the same number of years (2002-2013) implies that the number of septic systems installed in Rabun County since 1990 has almost doubled. See a copy of the TMDL Septic System Table as Table 6 of this report.

Table 6: Number of Septic Systems in the Little Tennessee, from 2004 TMDL Plan

Number of Septic Systems in the Tennessee River Basin

County	Total Septic Systems	No. of Septic Systems Installed 1990 to 2001	No. of Septic Systems Repaired 1990 to 2001
Catoosa	16,375	5,190	530
Dade	5,342	1,317	63
Fannin	11,999	5,086	402
Gilmer	12,538	6,730	120
Lumpkin	8,525	3,627	158
Rabun	10,713	4,150	294
Towns	6,817	2,760	0
Union	10,737	4,977	568
Walker	19,097	3,608	600
Whitfield	23,385	6,444	1,422

Source: 1990 Census Data, and the GA Dept. of Human Resources, Div. of Public Health, 2001

Septic systems have often been an assumed source of fecal coliform pollution in the mainstem Little Tennessee. The TMDL written for the mainstem Little Tennessee cites failing septic systems as having a "medium" estimated portion of contribution toward the fecal coliform pollution problem. The source assessment section of this report looks at this question more closely.

Other Permitted Discharges

The EPA provides guidance on items that should be addressed in a 9 Element Watershed Plan, and this information suggests a review of other types of waste generators in addition

to NPDES permittees. Permitted air emissions dischargers in the project area and Resource Conservation and Recovery Act (RCRA) generators were reviewed. Enacted in 1976, RCRA is the principal federal law in the United States governing the disposal of solid waste and hazardous waste. The Air Facility System (AFS) contains compliance and permit data for stationary sources of air pollution. Active permit and compliance information was accessed through the EPA's Envirofacts website. See Table 7.

Table 7: RCRA Waste Generators and Air Pollution Emissions permits in the Project Area

FACILITY INFORMATION	Lat	Long	PERMIT TYPE
GAP PARTNERS, INC 398 KELLY'S CREEK ROAD RABUN GAP, GA 30568	34.95757	-83.381160	Air, RCRA - Small Quantity Waste Generator
MULTITRADE RABUN GAP, LLC 1585 YORK HOUSE ROAD RABUN GAP, GA 30568-2423	34.953596	-83.376782	Air
REEVES CONSTRUCTION COMPANY - TUGALO REGION - DILLARD PLANT #74 79 CRUSHER RUN ROAD RABUN GAP, GA 30568	34.976573	-83.350456	Air
VULCAN MATERIALS CO. RABUN GAP ROAD RABUN GAP, GA 30568	34.9711109	-83.361111	Air
PARKDALE AMERICA JOHN BECK DOCKINS ROAD RABUN GAP, GA 30568	34.943691	-83.403623	Air, LAS & RCRA - Small Quantity Waste Generator

No recent violations for RCRA small quantity waste generators in the project area have been documented in the EPA's ECHO database, which stands for "Enforcement and Compliance History Online."

All of the air emissions dischargers in the watershed are compliant according to the EPA's ECHO database. Multitrade, a 20MW capacity wood-fueled biomass facility located adjacent to the former Fruit of the Loom facility (now known as the Rabun Business Park) is the largest air emissions discharger in the watershed. The refurbished facility started operating in 2010 and uses native renewable fuel from the local forest industry to sell power to a Georgia co-op under a long-term power purchase agreement. The remaining permits belong to Vulcan's rock quarry, Reeves Construction Company (an asphalt mixing company located adjacent to Vulcan's quarry) and Parkdale America.

One entity in the project area is permitted for a land application system (LAS) for disposing of treated wastewater effluent. These facilities are required through LAS

permits to treat all their wastewater by land application and are to be properly operated as non-discharging systems that contribute no runoff to nearby surface waters.

National Textiles had an LAS permit and actively applied waste to a designated area until recently. Parkdale Mills (also known as Parkdale America), the company that purchased National Textiles in 2009, is in the process of connecting to the Rabun County WRF and is phasing out land application at this site.

Agricultural Waste and Water Needs

There is one confined animal feeding operation (CAFO) but no waste composting facilities within the project area. The CAFO is a large-scale chicken farm located at the headwaters of the system, with Billy Branch running directly through the middle of the chicken houses. This is a potential source of fecal coliform input. Public input received suggested that the chicken litter from this facility was historically applied to farms and fields all over the valley, but that practice has been reduced significantly in recent years because the largest farming operation in the project area has elected not to apply the manure to its fields. This farm is discussed more in the Wolffork Valley discussion.

Grazing of livestock in pastures adjacent to rivers and streams and direct stream access creates opportunities for waste and sediment to enter the Little Tennessee as nonpoint source pollution. Additional agricultural use and areas where livestock have stream access in the project area is detailed in the land use/land cover discussion.

The Savannah-Upper Ogeechee Initial Recommended Regional Water Plan also looked at agricultural water use forecasts. Between 2010 and 2050, the Council does not expect a significant increase in crop demand for water, citing a current countywide need of 0.1 MGD until 2040, when it increases to 0.2 MGD. Non-Crop demand from 2010-2050 is forecasted to be 0.96 MGD. Ideally, this demand could be met with livestock watering devices connected to wells rather than through direct animal access to streams and creeks in order to limit the potential for further nonpoint source pollution.

Landfills, Underground Storage Tanks and Hazardous Waste Sites

There are no active municipal landfills in Rabun County. All Municipal Solid Waste collected in Rabun County and surrounding cities is disposed at R & B Landfill in nearby Banks County. Rabun County maintains a Construction and Demolition Landfill at Boggs Mountain Road. Rabun County formerly operated a municipal landfill within the county that was closed in 1993 and is now monitored as a hazardous waste site. This site located on Eastman Mountain Road, south of the City of Clayton, and is outside the project area.

The former Fruit of the Loom facility had an industrial landfill onsite that ceased accepting waste on July 6, 2012. The landfill is considered to be in closure by the GA EPD and is monitored as such.

The GA EPD Underground Storage Tank (UST) list was reviewed to determine if any active leaking USTs (also known as LUSTs) exist within the project area. Table 8

summarizes this information for locations determined to be within the upper Little Tennessee River watershed.

Table 8: List of LUSTs within the project area

Location Name	Address	City	Description	Date Received	Cleanup Status
RABUN GAP-NACOOCHEE SCHOOL	HIGHWAY 441 NORTH	RABUN GAP	Confirmed Release	01/27/1998	NFA - No Further Action
DILLARD SERVICE CENTER	US HWY 441 NORTH	DILLARD	Confirmed Release	07/23/1996	NFA - No Further Action
FORMER CIRCLE K #1235	US HWY 441	DILLARD	Confirmed Release	07/26/1996	In Remediation - Active System
SKY VALLEY RESORT	696 SKY VALLEY WAY	SKY VALLEY	Confirmed Release	10/23/1992	NFA - No Further Action
SKY VALLEY RESORT	696 SKY VALLEY WAY	SKY VALLEY	Suspected Release	09/09/1992	NFA - No Further Action
VALLEY GAS	6619 HWY 441 N	DILLARD	Suspected Release	09/27/1993	Suspected Release
PETROFAST FOOD STORE #9	7656 HWY 441 N	DILLARD	Confirmed Release	01/14/2009	In Remediation
PETROFAST FOOD STORE #9	7656 HWY 441 N	DILLARD	Suspected Release	01/14/2009	In Remediation
HASTY MART #12	US 441 & BETTY CREEK RD	DILLARD	Confirmed Release	10/07/1991	NFA - No Further Action

Most of the LUSTs are listed with a status of "No Further Action" (NFA). The EPD will consider a property to be eligible for NFA if soils samples show no detection of contaminants or the quantities detected are below Soil Threshold Levels. Two locations are in active remediation.

Two additional facilities within the project area were found to be potential or confirmed hazardous waste contamination sites, but they did not appear in the EPA's Toxics Release Inventory (TRI) database on the Envirofacts website.

The first site is at the former Fruit of the Loom Facility, which appears on the GA EPD's Hazardous Site Inventory (HSI) list. The Development Authority of Rabun County (DARC) provided 2011-2013 monitoring reports from Dunklee & Dunham, P.C. that state that Burlington Industries released trichlorethene (TCE) at the site sporadically to the facility's land surface. Staff of the Maintenance Department discharged TCE to ground adjacent to the Maintenance Building (referred to as the courtyard area) from 1955 to 1992, when the facility was sold to Rabun Apparel and the practice was discontinued. Staff also reported sporadic chlorine gas leaks, which may have resulted in chloroform contamination of groundwater. Both TCE and chloroform are considered to be volatile organic compounds (VOCs).

Groundwater and soil assessments were conducted from 2000-2006, and TCE and chloroform were documented in the surficial aquifer monitoring wells in the courtyard area. A corrective action plan (CAP) was reviewed and approved by GA EPD, and implementation of that plan began in 2009. Follow up sampling has shown successful reduction in contamination levels, and a review of the materials show that the contaminated plume that remains in the groundwater is moving away from the Little Tennessee River. Remediation is planned to continue until the contamination levels are below required thresholds.

The second potential hazardous waste site is located on John Beck Dockins Road and although the facility is listed in the EPA's Superfund Enterprise Management System (SEMS) and CERCLIS databases, it is not a superfund site. Superfund sites are polluted properties requiring a long-term response to clean up hazardous material. This site is also not detailed in the Georgia HSI database.

The site is located at the present-day Parkdale Mills facility, which was purchased in 2009 from National Textiles. Before National Textiles owned the facility, it was an electronics manufacturing plant owned by Sangamo Energy between 1973 and 1985. Surface water from the site enters the Little Tennessee River approximately 1,000 feet south of the facility.

The site was identified as a potential hazardous waste contamination site because it was classified as a small quantity waste generator in the early 1980s. The facility generated small quantities of 1,1,1, trichlorethane, toluene, methylene chloride, xylene and unspecified halogenated solvents. Since the waste handling practices were not well documented between the years of 1978-1983, the site was inspected to determine if any contamination occurred.

The Georgia Environmental Protection Division conducted a Preliminary Assessment (PA) for the U.S. Environmental Protection Agency (USEPA) in 1985 under the Hazard Ranking System (HRS). After the PA was conducted in 1985, the site was evaluated further under the HRS in 1988 (a Site Inspection) and in 2003 (an Expanded Site Inspection) and no documented release to groundwater was found. The site is not listed on the National Priorities List (NPL) because it is not eligible for long-term cleanup funds under CERCLIS. The EPA considers this site to be a low threat to human health and the environment.

Element 1: Source Assessment

Watershed Conditions

As previously described, the Little Tennessee River is considered to be a priority for conservation by many entities because of its relative health and biological diversity. The upper Little Tennessee River watershed is home to one UNESCO Biosphere Reserve at the Coweeta Hydrologic Laboratory. The watershed is also amongst the mountain region's highest priorities in the North Carolina Wildlife Action Plan.

The Betty Creek watershed was designated as a High Priority Species/Aquatic Community Stream in the GA Comprehensive Wildlife Conservation Strategy in 2005, and the whole ULT watershed is designated as a High Priority watershed in Georgia's State Wildlife Action Plan (Albanese et al 2015).

Water Quality Standards & Impaired Waters

Georgia's water quality standards assign various designated use classifications to all waters of the state as prescribed by the CWA. There are six designated uses in Georgia including fishing, drinking water supply, recreation, coastal fishing, wild river and scenic river. Most of the creeks and the mainstem Little Tennessee within the project area are designated as fishing waters. Mud Creek is designated as a water supply watershed. The GA EPD specifically details Mud Creek and Betty Creek as meeting their designated uses.

Georgia classifies all trout waters as either primary or secondary. Streams designated as Primary Trout Waters are waters supporting a self-sustaining population of rainbow, brown or brook trout. Secondary Trout Streams are those with no evidence of natural trout reproduction, but are capable of supporting trout throughout the year.

Georgia's Rules and Regulations for Water Quality Control Chapter 391-3-6-.03 Water Use Classifications and Water Quality Standards states the following designations and criteria for trout streams:

1. There shall be no elevation of natural stream temperatures for Primary Trout Waters; 2°F. or less elevation for Secondary Trout Waters.
2. No person shall construct an impoundment on Primary Trout Waters, except on streams with drainage basins less than 50 acres upstream of the impoundment. Impoundments on streams with drainage basins less than 50 acres must be approved by the Division (EPD).
3. No person shall construct an impoundment on Secondary Trout Waters without the approval of the Division (EPD).

A minimum 50 ft. undisturbed riparian buffer is required on all trout streams in Georgia. However, some activities (e.g., agriculture) are exempt from buffer requirements. Primary trout streams in Rabun County include the Chattooga River and its tributaries, the Little Tennessee River and its tributaries, and the Tallulah River and its tributaries.

The only secondary trout streams in Rabun County are Mud Creek from Sky Valley to its intersection with the Little Tennessee River and the Little Tennessee River downstream from the US 441 bridge.

Georgia's water quality standards specify limits for fecal coliform and ranges of acceptable levels for dissolved oxygen, pH and temperature. Water temperature and dissolved oxygen are inversely related: warm water holds less oxygen and cold water holds more oxygen molecules. Temperature fluctuation ranges are very limited for designated trout waters, as trout become stressed when the water temperature exceeds 67° F. As a result, the State of Georgia allows for this natural variation by allowing for a 10% excursion frequency for these parameters. See Table 9 for details on GA water quality standards. Georgia's water quality standards do not currently specify phosphate or nitrogen limits, but nutrient criteria are under development.

Table 9: Georgia's Water Quality Standards

Georgia's Water Quality Criteria: Drinking Water and Fishing				
Designated Use	**Fecal Coliform Bacteria**	**Dissolved Oxygen**	**pH**	**Temperature**
Drinking Water, Fishing	May-Oct < 200 colonies/100 ml* Nov-April <1000 colonies/100 ml* <4,000 instantaneous max	6 mg/l daily average, No less than 5mg/l at all times**	Within the range of 6.0 - 8.5	No elevation in primary trout waters. Not exceeding 2°F in secondary trout waters.

*As a geometric mean
**Criteria for trout streams

When waterways exceed these limits, they are considered 'impaired' because they cannot meet their designated use. There are two 303(d)-listed areas within the watershed; Keener Creek in Wolffork Valley and the mainstem Little Tennessee River from the Franklin Street Bridge in Dillard to the GA/NC state line. See Table 10.

Table 10: Designated Use and Impairment Table

Designated Use and Impairment Table			
Location	**Description**	**Designated Use**	**Trout Water Designation**
Black's Creek	Headwaters to confluence with Little Tennessee River	Drinking Water	Primary
Mud Creek	Headwaters to confluence with Little Tennessee River	Drinking Water	Secondary (Sky Valley lake to confluence)
Keener Creek	Headwaters to confluence with Little Tennessee River	Fishing	Primary
Mainstem Little Tennessee	US 441 Bridge to NC/GA state line	Fishing	Secondary (Dillard to state line)
Betty Creek	Barker's Creek to confluence with Little Tennessee River	Fishing	Primary

*All other areas not specifically listed as secondary are primary.

GREEN = Meeting designated use

RED = Not meeting designated use (impaired)

BLUE = Status unknown

Background Data and Reports

The upper Little Tennessee watershed is unique in that a large body of monitoring data exists due to the efforts of non-profits and state and federal agencies that have studied the watershed over the last 25 years. As such, limited data collection occurred during the development of this plan, and contemporary data collection was aimed at filling data gaps to net the most useful information for the effort and investment.

TAC members and Broadfork staff began amassing background data collected in the watershed almost as soon as work on the project began. Georgia DNR's WRD Stream Team has conducted sampling at five sites within the watershed recently. See Figure 17. The USGS collected a significant amount of water chemistry and bacterial data for the EPD in 2001 to determine if the river should be listed for impairment. Rabun Gap-Nacoochee School students and teachers have collected various water quality and chemistry data over the years as well.

It is likely that more historical data exists, but amassing that information would require a significant investment of time and funding to research the old records of various agencies. Funding for a more comprehensive historical data review is suggested as part of the implementation of this plan.

Since 1990 aquatic biologist Dr. Bill McLarney, based in Franklin, NC, has been conducting annual fish community assessments in the upper Little Tennessee River watershed. Dr. McLarney measures stream health by calculating an Index of Biological Integrity (IBI) score based on various metrics such as species, quantity, and disease rate. This is perhaps the most compressive and useful data set available to evaluate the Upper Little Tennessee River watershed.

Working now as an employee of the Land Trust for the Little Tennessee (LTLT), Dr. McLarney and volunteers collect and count fish at a given site (returning them unharmed to the water) and use the information to calculate stream health (IBI) scores. Beyond the scores, field notes that provide details about habitat conditions, incidence of disease, and notable land use activities help explain changes that occur over time. See Figure 18 for a map of Biomonitoring sites and most recent IBI ratings.

The Biomonitoring Program also has a macroinvertebrate dataset dating back to the 1990s, but in order for this information to be useful and comparable to other data sets, an investment of time is required to organize the raw data into a singular format and to calculate scores. This could be completed as part of the archival data research previously suggested as part of the implementation phase of this effort.

Another important data source for the production of this plan comes from the City of Clayton. As part of an agreement with EPD to expand wastewater treatment facilities in Clayton and Dillard, the EPD required a watershed monitoring plan and bi-annual water chemistry and bacterial data to monitor watershed conditions. The data collected allow for a geometric mean to be calculated once a year in cool and warm weather conditions, so the information is helpful in evaluating whether state standards might be violated. Parameters monitored by Clayton include temperature, DO, conductivity, pH, turbidity, fecal coliform, orthophosphates, ammonia, total phosphates, and inorganic nitrogen (nitrate/nitrites). The City of Dillard has contracted Clayton to complete the required sampling for their permit. See Figure 16 for a map of locations and Table 11 for site coordinates and descriptions.

Table 11: City of Clayton Sample Site Locations

Site name	Lat	Long	Notes
LTR-N: Little Tennessee River – North	34.993313	-83.381104	Lamb Road
LTR-D: Little Tennessee River – Dillard	34.976776	-83.375183	Greenwood Rd. Bridge
KC: Kelly Creek	34.971846	-83.364312	Kelly Creek at Kelly Creek Park, upstream of rock quarry trib
BC: Betty Creek	34.968146	-83.389296	RGNS footbridge at end of gravel road
LTR-S: Little Tennessee River – South	34.938356	-83.388241	Hwy 441 Bridge
MD-LTR: Mud Creek – Little Tennessee River	34.983017	-83.365952	Back side of River Vista RV Park
MD-SV: Mud Creek – Sky Valley	34.983929	-83.324089	Across from Sky Valley Clubhouse

TVA has collected IBI and macroinvertebrate data at the state line once. Just over the state line, in Otto, NC, is the USFS Coweeta Hydrologic Lab. This station houses a Long Term Ecological Research (LTER) program that has also provided synoptic water quality data that looks at summer and winter concentrations at four locations in the Georgia portion of the watershed. This information was only collected once, but provides a snapshot of water quality at the sites sampled. Parameters include conductivity, turbidity, ammonia, nitrates, TSS, total dissolved phosphorus, dissolved organic carbon, dissolved organic nitrogen and dissolved inorganic phosphorus.

See **Appendix E** for a summary chart of all the data and reports reviewed for this plan.

Data Collected During Plan Development

Rabun Gap-Nacoochee School students and teachers in the science department generously volunteered to collect water chemistry and bacterial data at eight sites in the watershed for this report. These samples were taken quarterly, with a few extra samples toward the end of the plan development period to help narrow down potential areas with high fecal coliform/E. coli pollution. The school followed GA Adopt-a-Stream protocol and used E. coli tests, which are a more specific test for determining fecal coliform levels in water samples. Parameters measured include pH, DO, conductivity, nitrates, orthophosphate, alkalinity, TSS and E. coli. See Figure 16 for a map of RGNS sample sites. See Table 12 for a description of site locations.

Table 12: RGNS Sample Site Locations

RGNS site name	Lat	Long	Notes
Keener Creek at Blue Ridge Gap Road	34.937065	-83.443085	Keener Creek At Blue Ridge Gap Rd.
Upper Little Tennessee at confluence of Billy and Keener Creeks	34.929978	-83.436138	Little Tennessee River at Billy Cr. and Keener Cr. Confluence
US 441 Bridge (South)	34.938323	-83.388193	Bridge over Little Tennessee River near Wolffork Valley
Kelly Cr. Rd. (Little Tennessee)	34.957626	-83.381989	Little Tennessee River at Kelly Creek Rd.
Franklin St. Bridge (Little Tennessee)	34.961029	-83.377190	Little Tennessee River above Darnell confluence.
Kelly Creek Road (Darnell Creek)	34.959816	-83.370567	Darnell Cr. at Kelly Creek Rd.
Greenwood Road Bridge	34.976776	-83.375183	Little Tennessee River at the Greenwood Rd. Bridge
State Line at Lamb Road	34.984692	-83.382162	Little Tennessee River at the NC/GA State Line

Visual Assessment Data

One of the elements required for the development of an EPA-approved 9 Element Watershed Plan is identification of pollutant sources and their causes. In an effort to gather information on pollutant sources and causes, a visual assessment was conducted in the project area.

The components of the visual assessment include:

- A driving tour (aka 'windshield tour') of the watershed to observe tributary and river conditions from public roads; and
- A visual inventory of channel and bank conditions from kayak on the mainstem Little Tennessee.

The driving tour was conducted on September 8-9, 2014. The kayak tour was conducted on September 13, 2014. Follow-up driving assessments were completed as needed throughout the winter and spring of 2015 to verify information and acquire additional information.

The visual assessments identified over 100 locations with potential problems and opportunities for conservation, which are mapped in this report. The driving tour covered as much of the 48 square mile project area as was practical via public roads (so as to avoid trespassing) and the paddling tour covered approximately 4 river miles. However, to make the project manageable, the plan focuses on evaluating tributaries with a watershed size greater than 1 sq. mile.

The information gathered from this assessment is categorized as follows:

- Buffer enhancement/restoration opportunity
- Livestock present
- Streambank restoration opportunity
- Multiple impacts
- Instream habitat impacts
- Buffer preservation opportunity
- Trash cleanup needed

This information was verified using aerial imagery from Google Maps and Google Earth Pro. See Figure 18 for mapped information.

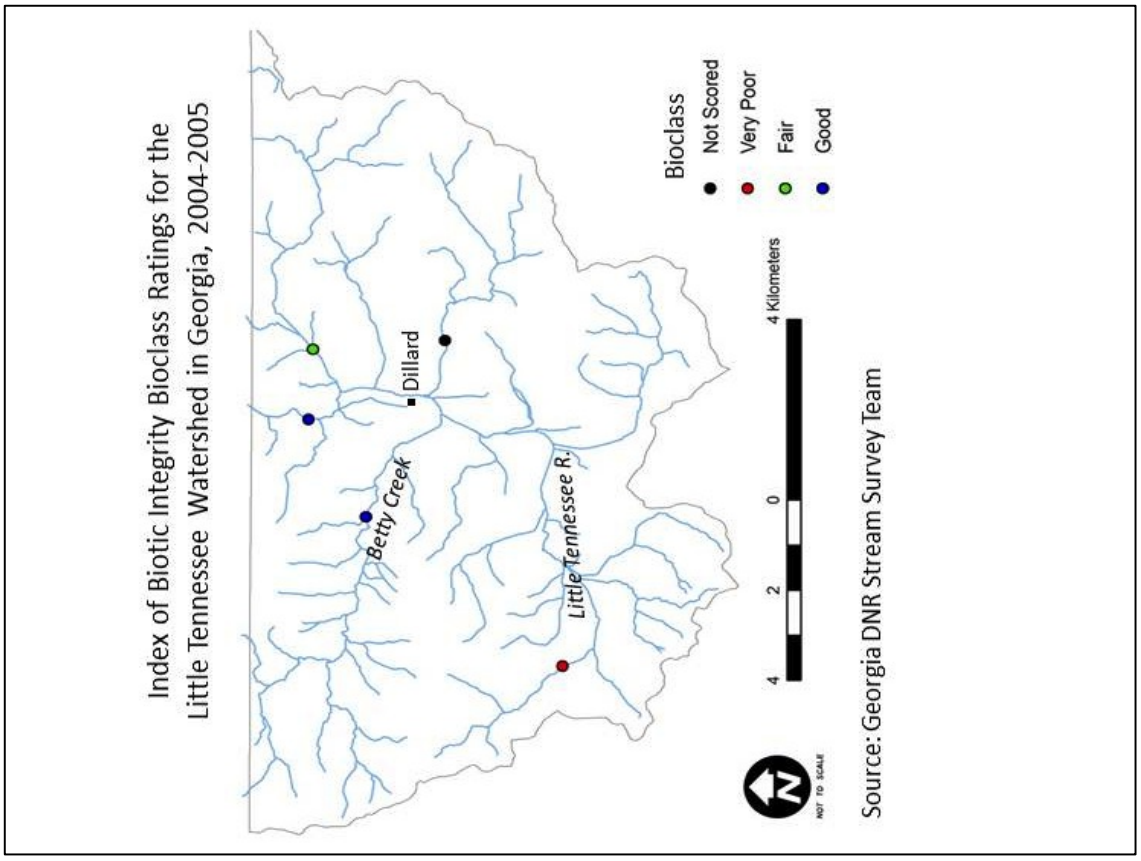


Figure 17: GA DNR Monitoring Sites

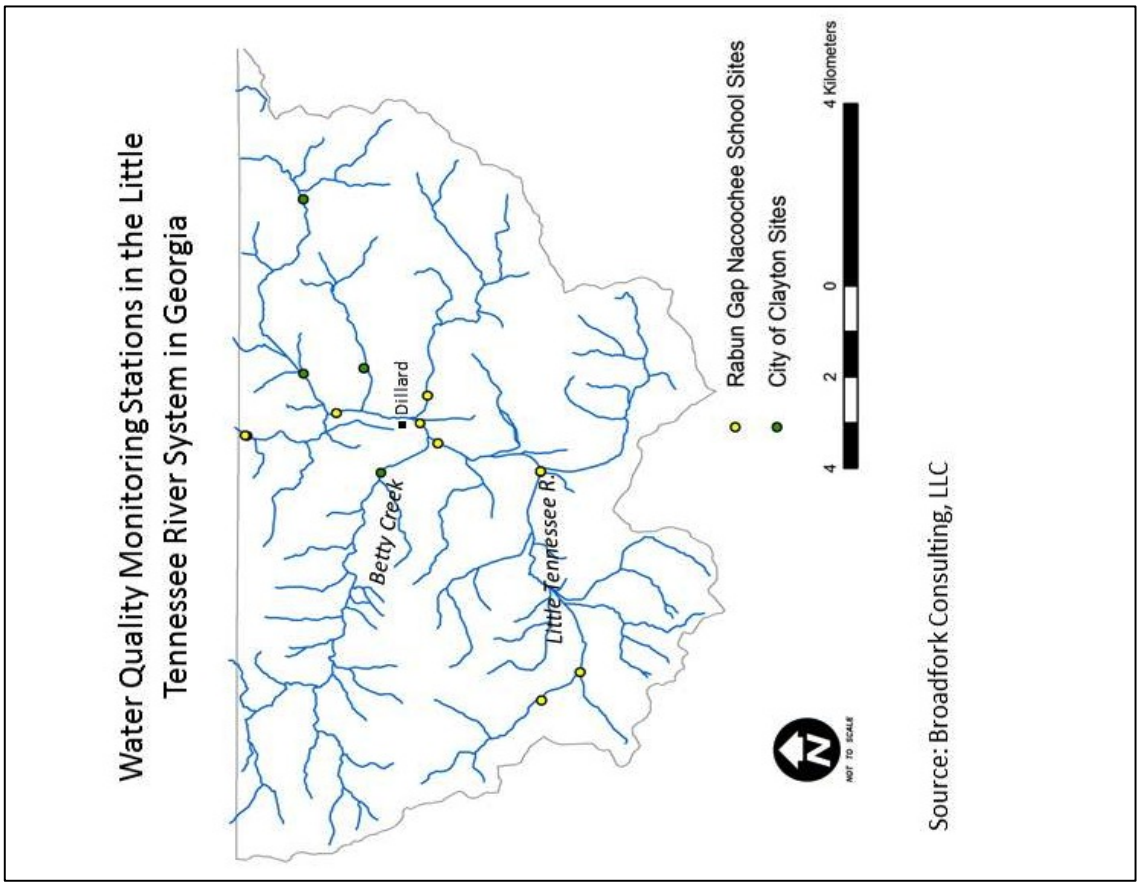


Figure 16: City of Clayton and RGNS Monitoring Sites

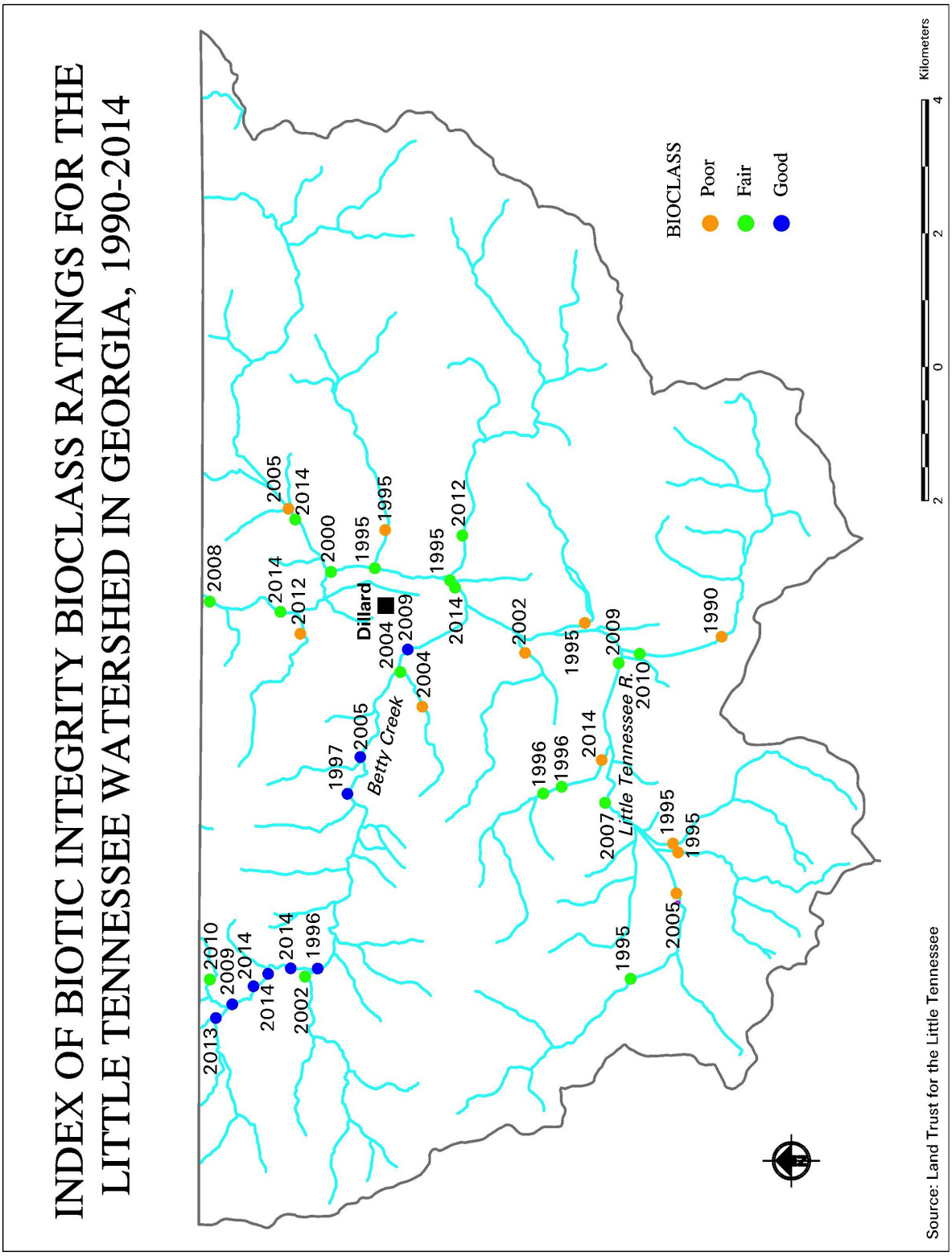


Figure 18: LTLT Biomonitoring Sites and IBI Scores

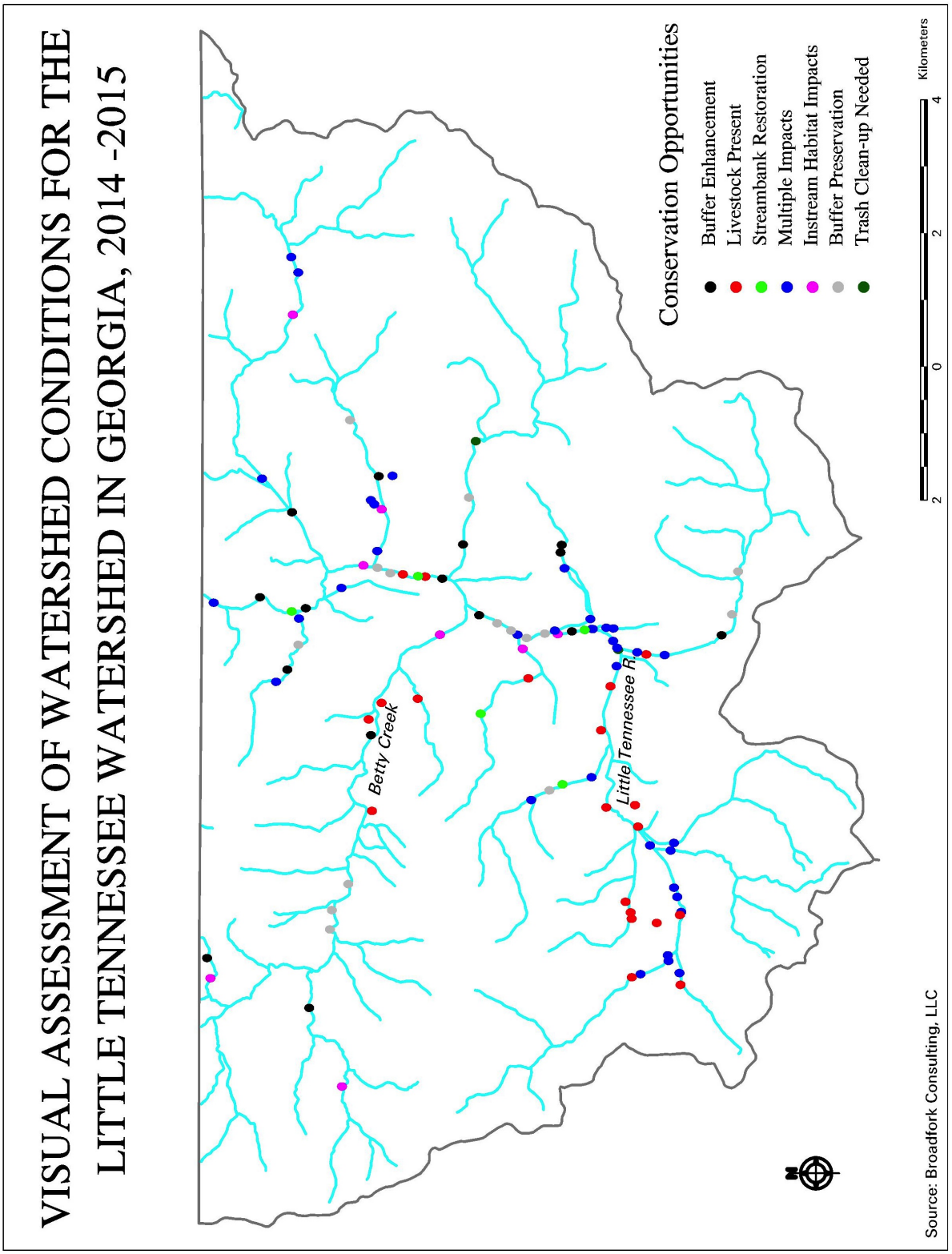


Figure 19: Map Documenting Visual Assessment Information

Stakeholder and TAC Source Assessment Input

TAC input on stressor identification was reviewed as well as the input received through the public input survey. TAC concerns about potential watershed stressors and causes of impairment are summarized as follows:

- Agricultural Impacts
- Habitat Impacts and Fragmentation
- Hazardous/Toxic Waste
- Point Sources
- Fecal Coliform
- Sedimentation
- Stormwater
- Urban Growth
- Interbasin Transfers
- pH/Buffering Capacity of waterways

Additional source assessment guidance was found in an excerpt from the Clayton-Rabun County Watershed Management 2011 Progress Report authored by Environmental Management, Inc. (EMI). According to the report:

The County Marshall has identified the following items/activities that, in his opinion, have led to degraded water quality within the watersheds:

- Runoff from impervious surfaces;
- Improperly maintained ditches for stormwater control;
- Gravel roads within county that impact water quality during rainfall events;
- Failing or improperly maintained on-site sewage disposal systems;
- Livestock impacting water quality;
- Improper application of fertilizer to agricultural lands;
- Discharge of stormwater runoff from roadways, increasing water temperature in surrounding streams.

These concerns echo the concerns of the TAC and the general public. Data collection and the subsequent review focused on evaluating whether or not these problems exist in the project area, and if so, to what extent and how they should be addressed. Some of these concerns will require further study for adequate evaluation.

Existing TMDLs

Waterways that are not meeting their designated use are required to undergo an evaluation that leads to the development of a Total Maximum Daily Load (TMDL) plan. A TMDL assesses the causes of impairment and makes suggestions for improvement. A TMDL was written for the listed section on the mainstem Little Tennessee in January 2004. An Implementation Plan was also completed for this stretch in April 2006.

A three-mile impaired stretch of the mainstem is listed for fecal coliform pollution. The Implementation Plan cites urban runoff and agricultural nonpoint sources as potential causes of impairment. More specifically, the Implementation Plan points to agricultural sources, degraded municipal sewer systems, failing septic tanks, nonpoint source runoff from wildlife/forestry activity and industrial sources as potential sources contributing to fecal coliform pollution. The plan cites a need for further monitoring to develop specific estimated contribution amounts from each potential source. The plan also suggests that failing septic tanks and nonpoint source runoff from wildlife are the leading causes of fecal coliform pollution. A link to the TMDL and Implementation Plan can be found in **Appendix F**.

Data reviewed for this plan suggest that aged septic systems and nonpoint source agricultural runoff are likely the top contributors causing fecal coliform impairment in the Little Tennessee River. This supports the TMDL and Implementation plan recommendation for septic tank failure as a source, but differs on the issue of livestock over wildlife populations on public lands as the likely source.

A TMDL is currently being drafted for Keener Creek by staff of the Watershed Protection Branch of the GA EPD. It is expected to be out for public review and comment in 2015. Management measures and implementation recommendations for Keener Creek should be made based on the information provided in that document. As of the writing of this report, the document was not complete, and this plan should be updated to include this information once it is finalized.

Pollution Source Evaluation

Areas of the watershed that have documented impacts have been identified by the GA EPD and reported as listed stream and river segments. The data used to list these areas was reviewed. Data from other sources for the rest of the watershed was also reviewed with the GA Water Quality Standards in mind, and if it seemed reasonably likely that those standards were being violated, then this report considers the area "potentially impacted." Most of the data reviewed does not meet Georgia's requirements to be used for listing or delisting streams, but the goal of this plan is not regulatory action. More monitoring information that meets Georgia's data collection standards for listing and delisting will need to be completed for definitive impact assessment.

Parameters considered harmful to aquatic animals and habitats that are not specifically limited by GA's Water Quality Standards were used when reviewing data. Georgia Adopt-a-Stream guidance on acceptable limits was generally used to evaluate the information. Examples include nutrients, turbidity, alkalinity and total suspended solids (TSS). North Carolina has a stormwater turbidity limit of <280 NTU, so the turbidity information was evaluated with this parameter as a threshold.

The only state standard that appears to be violated is the fecal coliform standard that is already documented in the mainstem Little Tennessee River. Keener Creek's source of impairment is forthcoming in the anticipated release of the TMDL in summer 2015.

Data collected for use in this plan showed a potential violation of fecal coliform standards, but more monitoring that is compliant with Georgia's requirements for listing and delisting needs to be completed.

Based on stakeholder input and a review of existing plans, background data and new data collected, additional *potential* impairments were identified. This plan will focus on load reductions and management measures aimed at addressing the listed causes of impairment. However, the plan will suggest management measures to address other potential impairments in tributary streams and areas that have not been assessed for listing. See Table 13 for a list of documented impairments and indicators addressed in this plan.

Table 13: Potential Stressors Table

Impairment	Potential Causes/Sources	Indicators
Violation of water quality standard limits for bacteria (fecal coliform and E. coli)	Livestock/agriculture, NPDES discharges, failing septic systems, stormwater, possibly wildlife	High fecal coliform readings
Slightly elevated levels of nutrients (Nitrates and Orthophosphate, not violating standards)	Residential development, agriculture, possible septic system failure, stormwater	Fish assemblages, slightly elevated nutrient measurements
Sedimentation	Commercial and residential development, past sedimentation, stormwater, agriculture	Visual documentation, fish assemblages
Poor quality habitat (in-stream and streamside)	Historic channelization, agriculture, lack of buffers, unstable streambanks, general habitat alteration, stormwater	Visual documentation, deposited sediment, fish assemblages

The upper Little Tennessee TMDL and the Implementation Plan both address the potential sources of fecal coliform pollution in the mainstem Little Tennessee. The report notes that the fecal coliform pollution does not appear to be coming from NPDES permitted discharges. The TMDL suggests the following potential sources:

- Domestic animals
- Sanitary sewer overflows
- Leaking septic tanks and/or illicit discharges
- Runoff from improper waste disposal
- Leachate from landfills
- CAFOs
- Dry storage of animal waste
- Livestock grazing
- Direct access to streams by livestock
- Chicken litter storage
- Waterfowl and wildlife

The Implementation Plan further specifies that urban runoff and agricultural nonpoint source runoff are the main contributors to fecal coliform pollution in the Little Tennessee. However, the Plan assumes that the City of Clayton's municipal sewer collection lines either run through the project area or that Dillard's collection lines are in the same condition as Clayton's. The report is unclear because Clayton's lines are not located within the project area. The report recommends a sanitary sewer evaluation and maintenance program should be completed, but this task has recently been completed by the City of Dillard.

The City of Dillard's sanitary sewer lines extend along an approximate one-mile stretch of US 441 from Henry Dillard Street to GA 246. The lines were installed in 1989 and have not been replaced except for areas where repairs or expansions have been made. Most of lines in the southern portion of the service area to the Dillard plant are located around 0.5 miles from the Little Tennessee River. Lines north of the plant and along 246 are located as close as 0.06 miles from the river in some cases. Force mains that utilize pump stations rather than gravity flow cross Lamb Creek, Betty Creek and GA 246. The City of Dillard completed a leak detection study within the last five years that employed both dye testing and video camera line inspection. This information was requested but not reviewed for this report. It is recommended that this information be reviewed during follow-up implementation that comes as a result of this plan.

The TMDL Implementation Plan also assumes that Rabun County's large percentage of public land implies high fecal coliform inputs from wildlife populations, but these lands are concentrated in headwater areas and fecal coliform data collected by RGNS for this project do not show high concentrations coming from public lands, with one possible exception on Keener Creek. Details about the possible source on Keener Creek are discussed in the next section.

There are no unmonitored closed landfills in the project area and there aren't any animal waste storage facilities or animal waste composting facilities in the project area, so these sources can also be ruled out.

Dismissing these potential sources, the remaining potential sources suggested in the TMDL and the Implementation Plan appear to generally agree with the data analysis performed for this report. Not every source is widespread throughout the project area, and details on the specific locations of these sources are discussed in the following section. In general, agricultural runoff and livestock access appear to be widespread, and the fecal coliform input from these practices on tributary streams is estimated to be high. It is likely that runoff from the single CAFO in the project area is also contributing some fecal coliform to the Wolffork Valley area. Streams with smaller watershed areas may have a much bigger impact than previously believed, and further sampling is needed to determine exact levels in each stream.

In summary, this planning process suggests that the most likely contributors to fecal coliform pollution as proposed in the TMDL are:

- Livestock grazing
- Agricultural nonpoint source runoff (pasture runoff, especially where land application of manure is practiced and no buffers exist)
- CAFO inputs
- Direct access to streams by livestock
- Leaking or failing septic tanks

Estimated load reduction needs and management measures to reduce fecal coliform contamination levels are discussed in the next section of this report.

Area 1: Wolffork Valley and Tributary Streams

This valley contains the very top of the headwaters for the upper Little Tennessee, and the mainstem forms where Billy Branch and Keener Creek meet. As mentioned, Keener Creek is listed for biota impacts on the fish community and a TMDL is forthcoming from the EPD in 2015. Billy Branch is notable because it contains the watershed's only large-scale chicken farm, and the creek runs directly between the chicken houses.

The farm has eight 40 x 400 ft. houses. On average, farms of this size produce approximately 896,440 birds per year. Neighbors report that the chicken litter is spread on adjacent fields throughout the valley if requested. Other than annual spreading of manure, specific waste management practices are unknown and NRCS staff members do not know if a waste management plan has been completed for this facility. It is possible that stormwater runoff from the practice of manure spreading is contributing fecal coliform to streams during rain events, and follow-up information should be collected during implementation to determine the quantities and locations of litter land application.

Once this information is reviewed, a waste management plan should be developed if one does not already exist. Rabun County's Water Supply Watershed Ordinance Section 16-288(4) also specifies that "the application of animal waste on land must follow guidelines established by the United States Department of Agriculture, Natural Resource Conservation Service and Georgia Agricultural Best Management Practices." Agricultural BMPs should be applied to reduce or eliminate fecal coliform inputs from this facility.

Other tributaries in this area include Double Branch, Pitt Branch, Taylor Creek and Rickman Creek. The entire area is heavily populated with livestock and row crop agriculture. It is estimated that this area has the highest concentration of livestock grazing of the entire project area. The visual assessment documented approximately 14 properties with livestock over the estimated 4.0 river miles (including Keener, Billy Branch and mainstem).

Figure 20: Wolffork Valley Hay Fields.

There are two commercial nurseries located in this area, one along Taylor Creek and the other on property adjacent to the Little Tennessee just before it crosses under the 441 bridge. Row crop agriculture is heavy along Pitt Branch and Taylor Creek, as well as some areas of the mainstem. Evidence of historical channelization and draining of wetlands is unmistakable on historic topo maps and upon visual inspection.

The Parkdale facility is located along Rickman Creek, and the plant has been used for various kinds of manufacturing since the 1970s. Land application of wastewater has also been practiced at Parkdale until recently. Parkdale maintains a healthy stream buffer at its property, and once land application ends at the facility, this may be a good partner for permanent land conservation. At least one other nearby property along Rickman Creek contains a former manufacturing facility that is now idle.

Bacterial monitoring (E. coli) data collection was concentrated on Keener Creek and the mainstem Little Tennessee. A control site was selected to try to assess the condition of Keener Creek as it leaves USFS land, but access is limited due to private land ownership between the road and USFS lands. The ‘control’ site ended up being Blue Ridge Gap Road, and there is some private land ownership above this site, before the USFS border. Tests here and farther downstream on Keener Creek showed periodic high concentrations of fecal coliform, suggesting that there may be a failing septic tank or an unpermitted discharge at one of the seasonal residences above Blue Ridge Gap Road.

Rabun County tax records show that the three residences closest to the stream and upstream of the sample location were built between 1984-1990. Some of the soil classifications in the area are known to be steep and rocky, so it is possible that there is a

failing septic system in the area. The Rabun County Health Department offers free septic system dye test kits, and outreach to this area should be a high priority of implementation.

Samples collected during at least one rain event on Billy Branch show elevated fecal coliform contamination that suggests nonpoint source runoff from the chicken houses may be contributing to fecal coliform pollution in the area. Temperature, DO, turbidity and pH were all within expected ranges in Wolffork Valley. RGNS sample teams noted trash in Billy Branch and a cleanup should be organized. High fecal readings at the lower end of Wolffork Valley (upstream of the 441 bridge) after rain events further suggest agricultural runoff and other impacts (e.g. possibly failing septic tanks) that persist downstream in the mainstem.

While the fecal coliform and water chemistry data were concentrated in the upper reaches of this section, IBI monitoring has been conducted on several tributary streams here. Wolffork Valley tributaries and the mainstem Little Tennessee consistently rank in the fair to poor range of IBI scores. Parkdale has been very generous with access permission for IBI monitoring, and they may be a good partner for land conservation or riparian restoration efforts. LTLT's Biomonitoring Program and GA DNR's Stream Team ranks Keener Creek as fair and very poor, respectively.

Visual assessment documented large areas of very little to no riparian buffer, with areas of bank instability and herbicide use directly adjacent to waterways. There is an approximate 0.5 mi stretch of the mainstem that does not have any riparian buffer. The upper reaches of Rickman Creek (downstream of USFS lands) appear to be managed similarly. Habitat alteration, agricultural practices and heavy livestock populations create the potential for significant fecal coliform loading in the entire Wolffork Valley area and it should be a priority for investment.

On USFS lands, brook trout have been documented in Rickman Creek. Brook trout are only found in a few other creeks in the project area, one of which is Keener Creek. Based on this information, one could make the case for prioritizing habitat enhancement projects on private lands just downstream of USFS lands on Keener and Rickman Creeks in order to extend potential brook trout habitat.

In summary, potential sources of impairment in this area include:

- Fecal coliform from nonpoint source agricultural runoff
- Possible septic system failures along upper Keener Creek
- Habitat impacts from minimal riparian buffers, livestock access and historic channelization
- In stream trash dumping requiring an organized cleanup
- Habitat impacts from herbicide use along streams

Area 2: Mainstem and Tributary Streams from US 441 to Betty Creek Confluence

This area encompasses the mainstem Little Tennessee from the 441 bridge down to just above the confluence with Betty Creek. Tributaries in this section include Black's Creek, Black's Branch and Jerry Branch. There are no listed stream or river segments in this area, but its potential as a source for fecal coliform pollution should not be overlooked due to the presence of several cattle farms on both the mainstem and tributary streams. The streambed exhibits heavy sedimentation and riverbanks are unstable and steep in many places.

Although a foul odor and foamy material was found to be consistently present at the Hwy 441 bridge, fecal coliform levels were generally very low (except in rain events, see discussion above) and all other water chemistry data is within expected ranges. Additional monitoring may be needed here to determine the source of the odor and foam.

Black's Creek enters the Little Tennessee almost immediately downstream of the Hwy 441 Bridge. The Black's Creek watershed winds back toward the north part of Mountain City, where it is bordered by row crop agriculture. There is one stretch that is approximately 0.40 miles long located north of Cathy Road in Mountain City that appears to be buffered on both sides of the stream. Further investigation of the quality and width of this riparian buffer would require access permission from the landowner.

Downstream of this area, but south of Yorkhouse Road where it crosses Black's Creek, there is a large property grazing cattle, goats and horses. It is unclear if the livestock are fenced out of the stream here, and this property would be a good candidate for NRCS conservation practices. The riparian buffer downstream of Yorkhouse Road (just before the creek enters the Little Tennessee) is also a good candidate for enhancement and/or restoration. Generally speaking, the riparian buffer in agricultural areas along Black's Creek is thin and in some cases non-existent. This tributary is a potential source of nonpoint source runoff and should be targeted for outreach and restoration.

Along the mainstem in this segment, the first property on the right side of the river is managed with a mowed grass lawn down to the water's edge, leaving no riparian buffer. Some livestock are grazed at this location and along Black's Branch (located just north of this area), and without a riparian buffer there is the potential for nonpoint source runoff. This area should be targeted for riparian buffer landowner education and enhancement or restoration.

At the top of the Black's Branch watershed, there is some residential development and evidence of herbicide used to manage the riparian buffer. Hay fields and some livestock are found just below the residential development, and buffers vary throughout but are mostly on the thin side of the spectrum, estimated to be 10 ft. or less in most places. Yorkhouse Road also crosses Black's Branch northeast of the Black's Creek crossing.

Figure 21: Mowed Lawn Erosion on Mainstem Little Tennessee Riparian Area.

As Black's Branch enters the Little Tennessee, evidence of historic channelization are compounded by its management. Visual assessment notes indicate that at least a 0.40 mile stretch of completely unbuffered area is located just downstream of the Yorkhouse Road crossing. Livestock graze the pastures adjacent to the stream and it appears as if cattle have unrestricted access to the creek. This creates a situation where warm summer temperatures combined with agricultural nonpoint source runoff could be contributing significant levels of fecal coliform and sediment to the mainstem Little Tennessee River.

Jerry Branch is the next tributary stream to enter the mainstem Little Tennessee and it has many of the same potential sources of fecal coliform input as does Black's Branch. Jerry Branch is a spectacular example of channelization, and as it enters the Little Tennessee a large sediment fan is present. The watershed's largest private landowner, Rabun Gap-Nacoochee School, owns the majority of land adjacent to both sides of the stream. Cattle graze much of this land and the livestock have access to the stream. RGNS is interested in fencing the cattle and restoring or enhancing areas of the riparian buffer to stop nonpoint source agricultural runoff, but funding has not been secured. This should be a high priority of the implementation plan.

There are no water chemistry or fecal coliform sampling sites located on these tributaries, but some IBI data exists. LTLT's Biomonitoring Program ranks Jerry Branch as poor, Black's Creek as poor to fair (depending on site location) and Black's Branch as poor. It should be noted that conditions in the upper reaches of Black's Branch appear to be healthier, but recent monitoring has not been conducted there.

The mainstem down from the confluence of Black's Branch to just above the confluence of Betty Creek appeared to be relatively healthy when assessed visually. There are two large, well-buffered areas of riparian forest (some as wide as 100+ft.) located along the eastern bank totaling almost 0.75 miles (though not contiguous) in length. It is estimated that 0.5 miles of this buffer are owned by the Development Authority of Rabun County and outreach should be conducted with this entity to conserve this area in a way that benefits DARC financially while achieving the goals of this plan. This stretch is estimated to be the largest, widest and longest riparian buffer along the mainstem within the project area.

The opposite side of the river is currently in row-crop agricultural production, converted from forestland to agriculture in 2013-2014 by the landowner, Rabun Gap-Nacoochee School. A moderate riparian buffer was left in place, estimated at widths varying from 10' to 25' along this field. Buffer enhancement is recommended here to increase shade, diversify habitat (providing a variety of trees, shrubs and grasses) and to increase the width of the riparian buffer in some of the thin areas. This should be a medium-high priority project.

RGNS collected data at the Kelly Creek Road bridge from September 2014-April 2015 for this plan. Although limited compared to the number of sample events at some of the other sites, this "snapshot" indicated that most parameters are within expected ranges with the exception of a very high E. coli count in December 2014 which did not coincide with a rain event. This sample would likely have violated state water quality grab sample limits.

There appear to be very few septic systems along the mainstem in this area. However, public input suggests that there is at least one septic problem at a small business nearby, and the business owner is working with the Rabun Water and Sewer Authority (Rabun WSA) to hook into municipal sewer lines. Supporting this effort should be a high priority of implementation in case this failing tank is contributing to poor water quality in the area. There are currently no municipal sewer collection lines in the area, but the Rabun WSA is working to expand service here. Further fecal coliform data collection is also recommended to better document and pinpoint sources.

In summary, potential sources of impairment in this area include:

- Fecal coliform from nonpoint source agricultural runoff
- Habitat impacts from minimal riparian buffers, livestock access and historic channelization
- Some habitat impacts from herbicide use along streams
- Potentially failing septic system

Area 3: Betty Creek Watershed and Tributary Streams

Betty Creek is the largest tributary stream in the Georgia portion of the watershed, and it consistently ranks as the healthiest tributary of the upper Little Tennessee in both states. All but the lower extreme of Betty Creek's watershed in North Carolina lies within the Southern Nantahala Wilderness, conferring excellent water quality protection to Betty Creek before it enters Georgia.

At the confluence of Betty Creek and the Little Tennessee River, the volume of the river is nearly doubled when it receives input from Betty Creek. Betty Creek is an attractive place to focus conservation planning efforts due to its health and estimated concentration of large, one-owner undeveloped parcels. There is no industrial activity in this watershed, but there is livestock grazing and hay pasture cultivation.

There are a few tributary streams with some identified potential impairments that were noted in recent IBI samples from LTLT and during the visual assessment. The far reaches of upper Betty Creek start in North Carolina, and for the purposes of this plan, were not studied.

Figure 22: Betty Creek Near High Darnell Road.

However, there is one small trout farm in operation just over the state line located on Betty Creek that may be contributing nutrients to the stream. There are also residential areas with very little buffer that may be contributing nutrients from lawn management practices. IBI reports have also noted a nursery that appeared to be contributing nutrients located at the confluence of Betty Creek and Barker's Creek, so this area should be studied further to determine current inputs and also to document potential future changes in water quality.

Barker's Creek is one of the few tributaries in the Betty Creek watershed that has received less than a good bioclass rating. IBI samples from below the Barker's Creek Mill indicate that extreme flow events created by opening and closing the mill dam for demonstration purposes is leading to sediment buildup and habitat impacts below the dam, resulting in a fair bioclass rating. This property is owned by the Hambidge Center for Creative Arts and Sciences, and the staff has been very cooperative for IBI monitoring and supportive of this planning process as a TAC member. The organization has been approached to discuss alternative management options that could improve the

situation below the mill. The Hambidge Center has decreased the usage of its mill and is studying other management methods to mitigate the impacts of the millpond releases in order to minimize sedimentation.

It should be noted that the Hambidge Center has spent considerable time, money and effort to restore a portion of Betty's Creek that has resulted in the creation of excellent habitat conditions and improved IBI scores. Hambidge is one of the largest landowners in the Betty Creek watershed and the organization has a history of good land management practices that preserve forest habitats as well as aquatic habitats. Hambidge will no doubt continue to work with implementation partners as a cooperative partner if additional management measures or conservation efforts are needed at the mill or anywhere else at their property.

The Patterson Gap area has some minor sedimentation problems stemming from the management of the USFS road that winds back through the area. Additionally, there is a commercial property with several impoundments on Patterson Creek that maintains a closely mowed lawn to the water's edge with a combination of herbicide and mowing equipment. There is approximately 0.15 miles of unbuffered stream bank at this development. This, combined with the gravel road inputs, has caused sedimentation in Patterson Creek and its tributaries.

Impoundments act as solar water heaters, especially in the case of ponds without any vegetative cover along the banks. This is problematic for cold-water mountain streams where the ponds are constructed within the stream channel because the outflow almost certainly increases temperatures downstream. This landowner should be contacted to gauge interest in conservation practice implementation.

Farther down on the mainstem of Betty Creek near O.V. Justice Road there are approximately 0.5 miles of channelized stream bank with little to no buffer. This may be the only place in the Betty Creek watershed where livestock still have access to waterways. NRCS staff confirmed that several miles of fencing were installed in this watershed in the early 2000s, so most of the cattle and horses noted in the visual assessment are presumed to be fenced out of waterways. However, at least one property appears to allow cattle access to an unnamed tributary stream. Follow-up fencing and buffer analysis is recommended to determine if additional BMPs are needed in the area.

Although this plan excludes discussion of tributary streams with a watershed area of less than one sq. mi., Sutton Branch deserves mention. This is a small tributary stream on RGNS land that enters Betty Creek just before the creek crosses under US Hwy 441. There is a cooperative effort between the school, local non-profit conservation organizations, state and federal agencies and the farmer who grazes cattle there to fence and restore this area. According to recent IBI scores, Sutton Branch scores between poor and fair, with a higher score on areas with a more robust riparian buffer.

A portion of the buffer was restored over 1998-2003 by RGNS students and staff. A study by the Coweeta Hydrologic lab on this stream suggests that the restored riparian zone is more efficient than the grazed riparian zone at diverting upper-soil nitrogen from the receiving stream to the atmosphere (Walker et. al, 2002). The City of Clayton collects water quality samples on Betty Creek just below its confluence with Sutton Branch. The data show fecal coliform levels and other parameters to be within healthy ranges. It would benefit the watershed to complete this fencing and restoration project and eliminate the potential for future impacts.

After crossing under US Hwy 441, Betty Creek passes through row crop agriculture (on both stream banks) with a generally good buffer. This highly visible area may be a good candidate for selected buffer enhancement that adds a variety of native shrubs, trees and grasses if the farmer leasing the property is amenable.

In summary, potential sources of impairment in this area include:

- Sedimentation from road runoff and impoundments
- Possible nutrient loading from various sources, more study needed
- Slight fecal coliform pollution from nonpoint source agricultural runoff
- Habitat impacts from selected areas with minimal riparian buffers and livestock access

Area 4: Mainstem and Tributary Streams from Betty Creek to Mud Creek Confluence

This area includes the mainstem Little Tennessee River from below the confluence with Betty Creek to just above the confluence with Mud Creek. Rabun County's WRF NPDES discharge point enters the Little Tennessee at the beginning of this section of the river. The City of Dillard's WWTP is located in the next section, but its sanitary sewer collection lines are mainly located in this area. Agricultural land use, varying riparian buffers, channelization, high vertical banks and hardening characterize the mainstem Little Tennessee in this area.

Two tributary streams are included in this reach: Darnell Creek and Kelly Creek. Behind Betty Creek, the public input received for this plan cites Darnell Creek as the second best in the project area for water quality and habitat. Darnell Creek also has a high percentage of its headwaters protected in USFS and conservation lands. The Kelly Creek watershed also has forested headwaters, but to a lesser extent. The Vulcan rock quarry is located in the Kelly Creek watershed.

Water quality and bacterial data from the mainstem sites in this area show elevated fecal coliform numbers, which occasionally violate standards and generally coincide with high counts upstream. Slightly elevated nutrient levels were detected in some of the RGNS samples collected in this area over the last 12 months, and the suspected source is agricultural runoff from mainstem farms and possible tributary stream contributions. Other sample parameters appear to be within healthy ranges.

The source of a December 2014 spike in fecal coliform is unknown, and the bacteria appear at levels that likely violate EPD grab sample standards at both the Franklin Street and Greenwood Road bridge sites. The Kelly Creek Road mainstem sample site previously discussed shows similarly high E. coli counts on the same day, so the Rabun County WRF is not a suspected source. Coordinated fecal coliform data collection at several mainstem locations that bracket tributary streams is highly recommended.

Although Dillard's sanitary sewer lines are located in this section of the watershed, they are mainly located along an approximate one-mile stretch of US 441 from Henry Dillard Street to GA 246. The lines were installed in 1989 and have not been replaced except for areas where repairs or expansions have been made. Most lines in the southern portion of the service area to the Dillard plant are located around 0.5 miles from the Little Tennessee River. Lines north of the plant and along 246 are located as close as 0.06 miles from the river in some cases. Force mains that utilize pump stations rather than gravity flow cross Lamb Creek, Betty Creek and GA 246. The City of Dillard recently performed an evaluation of the condition of its sewer collection lines (through an agreement with its engineering firm) and the results of this study have been requested. This information should be reviewed before implementation begins so that suggested BMPs can be tailored to any problems identified through that effort.

Darnell Creek has most frequently been sampled for IBI and water quality at the shooting range bridge (the last public bridge before entering USFS lands) and just upstream of the bridge on Kelly Creek Road that crosses over the stream. According to EPD records, the WRD Stream Team conducted an IBI sample at the upper shooting range location but a score was not calculated because the reach was determined to be too small for the IBI metrics to be applied. The EPD database shows monthly water quality samples collected at this site for all of 2013, which is helpful in evaluating downstream data collected by RGNS and LTLT.

At this location, water quality appears to be good with all sample parameters in healthy ranges, but fecal coliform levels have not been measured here. An illegal trash-dumping site was reported near the Trout Unlimited Bill Kelley memorial boulder and a cleanup should be organized.

Figure 23: Darnell Creek at the Shooting Range Bridge.

Downstream water quality data taken at the Kelly Creek Road bridge indicate slight nutrient loading which may be the result of residential development. LTLT's Biomonitoring notes from IBI samples in this area suggest a general downward trend in stream health and note that the fish community assemblage suggests nutrient loading as a source. Residential development increased in this area in 2005 when a cabbage field adjacent to the sample location was converted to a housing development with large pastures along the creek. The IBI scores were calculated as fair in 2011 and 2015 samples.

There are also several residential homes upstream of the sample site that were constructed between 1960-1963 with one dating back to 1947. Another nearby home (recently constructed) has a small impoundment in the front yard where it is possible that high nutrient fish food is used. Further data collection could be conducted, but general outreach and education among landowners about septic system, water quality protection and lawn maintenance may solve the problem more quickly. LTLT's Biomonitoring Director has documented the apron on the DOT bridge crossing over Darnell Creek at Kelly Creek Road as at least a partial barrier for aquatic organism passage.

Farther downstream, the Darnell Creek watershed is characterized by row crop agriculture. Additional sampling in that area should be completed to determine if these activities are contributing nutrients to the stream. This area is generally well buffered, and the input from this activity is suspected to be low.

The mainstem Little Tennessee between Darnell Creek and Kelly Creek is another place where livestock have direct access to the water. During the visual survey, cattle were observed depositing fecal matter directly into the stream so this is certainly a source of fecal coliform pollution. Two cattle access points were confirmed, and the areas are heavily trampled with little vegetation present. While the remainder of these pastures are fenced and somewhat buffered, the access points are contributing sediment to the river in addition to fecal matter. These properties should be a high priority for outreach and agricultural best management practice (BMP) implementation.

Across the river from the two cattle access points (on the western bank of the river) one larger landowner with good buffer management practices stands out: The Dillard House. The Dillard House owns approximately 0.5 miles of contiguous stream frontage with buffers that vary from an estimated 20 ft. in some places to around 100 ft. in others. Additional off-stream land holdings of the Dillard House appear to contain riparian wetland areas. No outreach has been conducted to assess landowner interest in conservation action, so implementation of this plan should include outreach to this landowner as a priority.

Below the confluence of Kelly Creek with the mainstem Little Tennessee and approximately 0.3 miles upstream of the Greenwood Bridge sample site, the habitat conditions in the river appear healthy. With the exception of one obviously straightened and hardened reach (historically altered), the vertical banks are reduced to 4' or less and the streambed is dominated by cobble substrate rather than fine sediment. The river

returns to a natural meander pattern, and the riparian buffer on both sides here appears to average 25 - 40 feet in most places.

This is especially impressive given that these parcels (65 acres on the east side and 54 on the west) are in row crop agricultural production. The eastern landowner has another 41-acre tract just downstream of Greenwood Bridge that extends the west-side buffer another 0.4 miles, though it is not quite as robust throughout as the 65-acre tract. Across from this additional parcel is the site of a successful cattle fencing and buffer restoration project completed by NRCS at the confluence of Mud Creek and the mainstem Little Tennessee. Implementation of this plan should make it a priority to research incentives for landowners who maintain riparian buffers that are this healthy, and work to connect these riparian corridors while enhancing the properties in between with buffers widths less than 25 feet.

According to an interview with landowners in this area, there was a significant flood event sometime in the 1960s that carved out a new bend in the river between the Franklin Street Bridge and the Greenwood Road Bridge. The landowner at that time moved the channel back over out of the field, and filled in the newly created channel with carpet remnants and household trash. The current owner has since removed the trash and hauled it away to a landfill. There is still evidence of bank hardening and straightening at this location. The USGS topographic map now shows a channel with an X over it at this location as a result.

Kelly Creek is monitored for water quality at Kelly Creek Park, which is owned and managed by Vulcan but open to the public. Based on descriptions of the sample location by City of Clayton staff, their sampling point is located just upstream of the confluence of Kelly Creek and a small unnamed tributary stream that borders the park. The unnamed tributary carries the NPDES effluent from the Vulcan plant.

Figure 24: Kelly Creek Park Unnamed Tributary Stream.

As previously mentioned, Vulcan staff explained that the plant operates on a closed loop system and rarely discharges under its NPDES permit, and the EPA ECHO compliance database reported no violations at this facility in the last two years.

The unnamed tributary at Kelly Creek Park often runs cloudy and the streambed exhibits evidence of heavy sedimentation. The stream banks are largely unbuffered with lawn extending down to the water's surface. The riparian area was observed being regularly managed with herbicide. As a result of the lack of vegetation, the stream bank is sloughing off into the waterway. Despite the poor in-stream conditions, small fish and other aquatic organisms have been observed there.

Visual assessment and public input during the planning process noted a frequent reduction in water clarity during and immediately after rain events both at the park and upstream of the park. The water was observed flowing milky-white in a rain event as recently as spring 2015 during a follow-up visual assessment. This appears to be gravel dust, and the source of the input has been identified as stormwater runoff from the Vulcan plant.[1]

Figure 25: Truck with a tailwind of dust leaves the Vulcan quarry. A new wash station is expected to improve the situation.

Vulcan was made aware of the stormwater runoff problem and is addressing it as of the writing of this report. In response to the information discovered through this planning process, Vulcan has voluntarily repaved its front entrance, footing the $33,000 cost without public assistance. Plans for a road spray and stormwater collection system have also been drawn, and construction is expected to be completed in October 2015.

Stormwater from the front entrance of the quarry will now be directed away from the stream and toward the quarry's settling ponds, which feed into its NPDES treatment area. The paved entrance will be maintained by sweeper trucks to limit the amount of dust that collects on the asphalt. Previously deposited sediment from unwashed vehicles leaving the plant and past gravel spills on Kelly Creek Road have certainly contributed to the stream's sediment problem. Trucks leaving the quarry have been observed with a tailwind of dust behind and it is likely that this is a mix of dust from both the truck body and the road. A notable reduction in dust has been observed since the paving of the front

[1] It should be noted that activities at the Vulcan quarry have improved significantly since the 1980s, when milky-white water was often visually documented in the Little Tennessee River north of the town of Franklin, North Carolina (approximately 33 river miles north of the Vulcan quarry) after rainstorms in Georgia.

entrance. Rabun County has also just repaved Kelly Creek Road and the entrance to the Kelly Creek Park. Stormwater from these areas is still directed toward the creek, and an effort should be made to work with the County to direct runoff away into a settling basin instead of the stream.

It is recommended that all trucks follow the standard practice of covering bed loads prior to leaving the quarry. It is commonplace at larger quarries (including other Vulcan quarries) for the bed and body of the truck to be sprayed with water from the top down before the load is covered and the truck leaves the facility in order to reduce dust. It would be ideal to include a full truck rinse in order to eliminate the possibility of significant sediment deposition in the future. However, the road wash sprayers may accomplish this, so further recommendations should be made once construction of the sprayer system and settling pond is complete. Follow up visual assessment during rain events is also highly recommended.

Vulcan has been a very cooperative and active participant in the TAC for the development of this plan. Vulcan's ownership of the park, its demonstrated willingness to respond to environmental stressors potentially caused by quarry activity and the stream's high visibility in a public park setting make it a high priority for buffer restoration activities.

Water quality data on Kelly Creek upstream of the unnamed tributary show some impacts as well. Fecal coliform standards appear to have violated EPD geometric mean standards in 2011, 2012 and 2013, with at least one event during this time likely violating "instantaneous max," or "grab" sample limits as well. Other sample parameters appear to be within healthy ranges. The apron at the DOT bridge crossing Kelly Creek at Kelly Creek Road appears to be at least a partial barrier for aquatic organism passage. Further assessment is recommended. There is light residential development and one meat processing facility located upstream of Kelly Creek Road. No other agricultural livestock grazing was noted in this area during visual assessments, and the source of the bacterial contamination is unknown.

Outreach to both the residential landowners in the area and the processing facility should be conducted to determine if there are failing septic systems or BMPs that could be put in place. If the meat processing facility is found to have poor waste handling practices, implementation efforts should focus on non-regulatory action to help get the facility into compliance as quickly as possible. It is unknown if the owners of the facility would be receptive to BMP implementation.

After Kelly Creek leaves the Kelly Creek Park, it passes through agricultural fields mainly in row crop production. There is one large farm that appears to have approximately 0.2 miles of virtually unbuffered stream frontage. It is unknown if this landowner would be receptive to conservation action, but outreach with NRCS staff could be conducted to gauge interest and more accurately assess stream conditions. LTLT's IBI samples from this reach have scored a poor bioclassification rating.

In summary, potential sources of impairment in this area include:

- Fecal coliform from nonpoint source agricultural runoff and livestock access on the mainstem
- Possible septic system failures along upper Darnell Creek and Kelly Creek
- Nutrient loading from maintained lawns and pastures, possibly also from fish feeding at ponds
- Habitat impacts from minimal riparian buffers and livestock access on the mainstem and lower Kelly Creek
- Quarry dust sedimentation entering a tributary stream through stormwater runoff causing habitat impacts
- Trash dumping requiring an organized cleanup
- Habitat impacts from herbicide use along streams
- DOT aprons creating a barrier for aquatic organism passage on Darnell and Kelly Creeks

Area 5: Mud Creek to the State Line

This section is the final segment of the project area and it encompasses the mainstream Little Tennessee River from just below the confluence of Mud Creek to the NC/GA state line. There are two tributary streams in this area, Mud Creek and Lamb Creek. The City of Dillard's wastewater treatment plant (WWTP) discharges to the mainstem just downstream of the Mud Creek confluence. A force main connecting to the City of Dillard's sanitary sewer system coming from River Vista RV Park crosses the Little Tennessee at GA 246. Force mains that utilize pump stations rather than gravity flow cross Lamb Creek, Betty Creek and GA 246.

A restoration and fencing project has been completed at a farm located at the confluence of Mud Creek and the mainstem Little Tennessee. The approximate 40-acre farm fenced around 25 cattle out of the river and Mud Creek about 10 years ago. In-stream and riparian habitat conditions are good in this area until just above the bridge at GA Hwy 246. One landowner on the eastern bank is experiencing bank loss along his hay fields. The buffer on this property lacks diversity and in some areas is totally mowed to the water's edge. The landowner has expressed interest in working with NRCS or other programs to address the situation. This should be a high priority for action.

Water quality data has been collected at the GA 246 bridge and at the state line on Lamb Road. USGS data taken over the course of 2001 was used to list the mainstem Little Tennessee for fecal coliform impairment. The City of Clayton and RGNS students sample at the state line. The state line data from Clayton's samples indicate that fecal coliform geometric mean levels are likely still violating state water quality standards. The data also show occasional, slightly high concentrations of nutrients, likely a cumulative effect from upstream inputs from mainstem and tributary sources. The upper portion of Lamb Creek also contains a housing development with mowed grass to the water's edge,

and it is possible that lawn fertilizer may be contributing to the slightly elevated nutrient load here.

It is noteworthy to mention historic EPD water quality and bacterial data from the 1990s show a significant reduction in nutrient and fecal coliform levels over time, so the overall trend in this area appears to be moving toward improved water quality. This is likely the result of stronger industrial NPDES effluent limits and increased implementation of agricultural BMPs over the last 40 years.

Biological monitoring has occurred at the GA 246 and state line sites as well. The WRD Stream Team sampled at GA 246 in 2005 and got a good IBI rating. TVA conducted IBI and macroinvertebrate sampling (Ephemeroptera, Plecoptera, and Trichoptera sampling or EPT) in 2006 and the site received a fair IBI rating and a good EPT rating. LTLT's Dr. McLarney has sampled at both GA 246 and the state line. Stream health IBI ratings from LTLT's 2007-2014 samples at GA 246 are fair. Ratings from 1990-2004 at the state line oscillate between fair and poor. However, the site has not received a poor rating since 2001. The most recent IBI score was fair in 2004.

Past problems with the Dillard WWTP have been documented, but there have not been any documented impacts to the aquatic community recently. In 1994, a malfunction at the plant appears to have played a role in an almost "complete disappearance of fish downstream of the plant" according to LTLT IBI field survey notes. According to EPA records, the plant currently operates with few to zero NPDES effluent limit violations and no noticeable effects on the fish community have been attributed to the plant in recent IBI data. Generally, Dr. McLarney and others attribute the historically poor condition of the mainstem in this area to pre-CWA discharges at the former Fruit of the Loom plant, which has also been largely remedied. IBI scores over time in both of these areas show that the fish assemblage is responding positively to the reduction of these pollutants.

The City of Sky Valley is located in the upper Mud Creek watershed at an elevation of 3,500 ft. above sea level with a total land area of three square miles. The City was first developed into a ski resort in the 1960s. The Sky Valley Country Club is the centerpiece of the City and the 18-hole golf course includes a 1,300 square foot clubhouse (recently constructed), several impoundments, and a mix of residential development that includes timeshares, private homes and one apartment complex. Mud Creek runs through the center of the course with approximately 1.6 miles of stream frontage culminating in a 12-acre pond at the western end of the development.

In the past, the ponds at Sky Valley have been linked to downstream sedimentation, including at least one impoundment breach that resulted in tons of sediment washing downstream sometime in the 1980s; reportedly, enough sediment washed out that Estatoah Falls ran chocolate brown for a day without any rainfall. It is likely that some of the fine sediment still found layering the stream bottom downstream of Estatoah Falls could be attributed to this event. Also, as previously mentioned ponds act as solar water heaters, and any effort to mitigate this effect on downstream temperatures should be pursued.

Figure 26: Mud Creek as it Flows Through the Sky Valley Resort Golf Course.

Along those lines, Audubon International has developed a Cooperative Sanctuary Program for Golf that seeks to create or improve wildlife habitat on golf courses as well as educate surrounding landowners about the importance of wildlife habitat and water quality. This voluntary program offers training materials and provides assistance for golf clubs and course managers who are interested in preparing and certifying their courses an as Audubon Cooperative Golf Course Sanctuary. The main components of the program include environmental planning, wildlife habitat and management, chemical use reduction and safety, water conservation, water quality management and outreach and education.

The Sky Valley Country Club has not been approached about implementing the Audubon Cooperative Golf Course Sanctuary Program or any other BMPs, so outreach to the new owners should be a priority of implementation.

Just downstream of Sky Valley the terrain changes to steep, forested land and there are two large waterfalls located approximately 0.5 mi. apart: Mud Creek Falls and Estatoah Falls. From the natural barrier formed by Estatoah Falls, the creek generally parallels Georgia Highway 246 until it meets the Little Tennessee. Approximately 1.5 miles before the stream enters the Little Tennessee, the land use surrounding the stream changes from undeveloped forest to row crop agriculture. Evidence of past channelization is apparent.

Buffers in this area and the area of Sky Valley are very limited. There are approximately 0.8 miles of unbuffered stream in Sky Valley, and another 1.0 miles of little to no buffer along Mud Creek in the lower valley's cultivated areas. The streambed in this area of Mud Creek is covered with thick deposits of fine sediment.

Water quality samples have been collected by the City of Clayton in Sky Valley and in the lower portion of Mud Creek near Kelly Creek Road. Fecal coliform readings are generally low, with no suspected violations of state water quality standards. Other parameters for the state water quality standards appear to be within acceptable ranges; however, slightly elevated levels of orthophosphate have occasionally been documented. This is likely the result of agricultural and lawn fertilizer nonpoint source runoff.

LTLT's Biomonitoring Program normally samples downstream of the Kelly Creek Road bridge. IBI scores at this site oscillate between poor and fair with the most recent 2014 rating being fair. In 2004, the GA WRD Stream Team sampled upstream of LTLT's site, above the bridge where the stream passes between an RV park and agricultural fields. WRD results show a fair rating, but when TVA metrics are applied (these are the metrics that LTLT uses) the score drops to poor. Follow-up IBI monitoring was conducted by LTLT in 2015 and the resulting score was again poor.

The Biomonitoring Program has also documented the bridge at Kelly Creek Road on Mud Creek to be at least a partial barrier to aquatic organism passage. Stakeholders and implementation partners should seek opportunities to work with the GA Department of Transportation to remedy the issue of passability if this bridge or the other bridges at Kelly Creek and Darnell Creek become eligible for repair or replacement funds.

There are no water quality data on record for Lamb Creek, but there is IBI data from 1995, 2002 and 2012 from LTLT. In 1995, Lamb Creek was documented as a healthy stream with a good IBI rating and ample riparian cover. It also supported rainbow trout. Shortly after the sample was completed in 1995, a large-scale housing development located approximately 0.5 miles upstream of the sample site removed all riparian vegetation, channelized the stream and graded bare soil down to the water. The resulting sedimentation of Lamb Creek continued, as the approximately 0.7 miles of stream frontage remained unstabilized and unprotected for the duration of development. Lamb Creek had not recovered by 2002 or 2012 when it scored a poor IBI rating.

In summary, potential sources of impairment in this area include:

- Habitat impacts from residential development resulting in sedimentation
- Habitat impacts from narrow or non-existent riparian buffers and historic channelization
- Possible nutrient loading from cumulative effects of maintained lawns, golf course, row crops and pastures
- Potential herbicide and fertilizer use along tributary streams causing habitat impacts
- DOT apron creating a partial barrier for aquatic organism passage on Mud Creek

Elements 2 and 3: Load Reduction Needs & Management Measures

Watershed Planning guidance from the EPA and GA EPD specify that load reduction calculations and management measures should be made for pollutants identified in listed waters. If a TMDL exists for these waters, then the load reduction information from the TMDL should be used. A TMDL has been written for the fecal coliform pollution in the mainstem, and a TMDL is due to be released for public review in 2015 on Keener Creek. These documents should be used to inform load reduction targets.

Mainstem Little Tennessee

The mainstem Little Tennessee TMDL calls for a 69% reduction of fecal coliform levels. A link to the TMDL document can be found in **Appendix F**.

The TMDL suggests the following management measures:

1. Compliance with NPDES permit limits and requirements;
2. Adoption of NRCS Conservation Practices; and
3. Application of Best Management Practices (BMPs) appropriate agricultural or urban land uses, whichever applies.

Furthermore, the Little Tennessee TMDL Implementation Plan suggests that the fecal coliform levels are attributed to nonpoint source runoff from wildlife and failing septic systems, but also specifies that agricultural nonpoint source runoff is contributing as well.

The Implementation plan suggests that the most effective management measures include:

- Local County land development guidelines and ordinances
- Regulation of on-site sewage management systems
- Implementation of EQIP/NRCS agricultural programs
- Sanitary sewer maintenance program
- Secure 319 grant funding
- Secure Clean Water State Revolving Fund money
- Secure Water and Waste Disposal Systems for Rural Communities loans

Source assessment determined that the fecal coliform inputs are not likely to be coming from NPDES discharges or sewer collection lines. The plan suggests that additional monitoring is needed to determine how much of the fecal coliform pollution is coming from wildlife. This additional monitoring has not been completed, and targeted monitoring is suggested as a potential management measure to narrow efforts.

The Implementation Plan estimates that the largest reductions in fecal coliform levels (>75%) from agricultural sources will come from implementation of EQIP/NRCS agricultural programs. The largest reductions from septic system fecal inputs will come from local ordinance implementation to control septic management, land acquisition and

mitigation banking and grants/loans to pay for septic repairs and general implementation activities.

Based on the source assessment conducted for this planning process, further study on tributary stream fecal coliform inputs is also suggested. In terms of septic system management measures, it is also recommended that dye tests be conducted in suspected areas of failing systems, and that failing systems be replaced or repaired. Table 14 summarizes the suggested management measures summarized in the TMDL Implementation plan and also includes new recommendations from this planning process.

Estimated load reductions expected from each measure are taken from the TMDL Implementation document. Load reduction information was also estimated using the Georgia Soil and Water Conservation Commission's "Best Management Practices for Georgia Agriculture" manual.

Table 14: Management Measures and Estimated Load Reductions for the Mainstem Little Tennessee River

Possible Management Measures	Stressor	Estimated Load Reduction	Evaluation Measures
Livestock Exclusion Fencing	• Bacteria • Excessive nutrients	>75% of fecal coliform bacteria, up to 99% of fecal coliform colony forming units on small streams. 60% of Nitrogen	Fecal coliform testing Water quality testing that includes nutrients and TSS/turbidity monitoring
NRCS Conservation Practices (includes heavy use area protection, watering tank installation, etc.)	• NPS runoff • Bacteria	>75% of fecal coliform bacteria Has the potential to reduce erosion by 80%	Fecal coliform testing Water quality testing that includes nutrients and TSS/turbidity monitoring
Local Ordinances – Septic and Development Oriented	• Bacteria • Excessive nutrients	>75% of fecal coliform bacteria	Fecal coliform testing Water quality testing that includes nutrients
Land Acquisition	• Bacteria • Excessive nutrients	>75% of fecal coliform bacteria	Site-specific fecal coliform testing
Funding for Implementation Activities	• Bacteria • Excessive nutrients	>75% of fecal coliform bacteria	Fecal coliform testing Water quality testing that includes nutrients and TSS/turbidity monitoring
Septic Dye Tests and Septic Repair	• Bacteria • Excessive nutrients	Locating/repairing failing systems should eliminate >75% of fecal coliform bacteria	Site-specific fecal coliform testing

There are some areas of the watershed where BMPs have already been installed through NRCS programs. According to NRCS staff, most of the cattle with access to Betty Creek were fenced out in early 2000 as a special project in cooperation with NRCS. Not long after that, a 38-acre cattle farm with frontage on the Little Tennessee and Mud Creek installed BMPs and restricted cattle access through the EQIP program.

Similarly, the Rabun County Health Department is inspecting potentially failing septic systems upon request and ensuring that repair/replacement takes place on properties with identified problems. The Department is also in the process of digitalizing its septic installation records and creating GIS data layers that show septic location and installation year. Implementation of septic management measures should focus on working to identify failing septic systems in targeted areas in cooperation with the Health Department, and additional secured funding should be used to offer a cost-share repair/replacement program.

During the visual assessment, background data collection and GIS analysis phase of this project, approximately 25 properties were identified along waterways with livestock present. It is estimated that of those 25, approximately 19 have unknown stream access conditions or confirmed livestock access to streams. One large poultry farm adjacent to a stream was identified, and it is large enough to be considered a Confined Animal Feeding Operation or CAFO. Waste handling practices are unknown at this farm and NRCS staff reports no prior NRCS activity at this farm. This farm appears to be a potential source for fecal coliform loading in Billy Branch, and the suggested management measure is to work with NRCS and the landowner to complete a Comprehensive Nutrient Management Plan and implement NRCS practices and strategies to address the potential impacts to natural resources.

Keener Creek

Information in the forthcoming TMDL document for Keener Creek should be reviewed once available, and this plan should be updated to reflect the findings of that plan. An implementation plan specific to Keener Creek based on that document should also be completed, and funding for the creation of an implementation plan for Keener Creek should be written into future 319 grant applications for this watershed.

During the visual assessment, background data collection and GIS analysis phase of this project, potential fecal coliform impairment was identified, but further monitoring to meet GA EPD's geometric mean requirements should be completed. Access to upstream USFS lands via privately held land was not secured for sampling under this plan, so any future monitoring efforts should make upstream baseline sampling on confirmed USFS lands a priority.

Keener Creek is listed for biota impairments based on fish community assessments. Nutrient loading from possibly failing septic systems is a potential stressor, but the sample responsible for this listing was also conducted in an area with poor riparian habitat conditions. A potential management measure to improve Keener Creek is to

complete buffer restoration and enhancement on private lands along Keener Creek. This area should also be targeted for cooperative septic system assessment with the Rabun County Health Department.

At the start of this project, there was confirmed livestock access to this section of Keener Creek as well. Development of an NRCS conservation and management plan, and implementation of associated BMPs is recommended to address potential fecal coliform and sediment inputs from livestock access. Note, however, that load reductions and targeted management measures will be based on the TMDL document expected to be finalized by the GA EPD sometime in late 2015. See Table 15 for summary management measures for Keener Creek.

Table 15: Potential Management Measures for Keener Creek

Possible Management Measures	Potential Stressors	Targeted Load Reduction	Evaluation Measures
Riparian Buffer Plantings	• Poor quality habitat	Unknown	Fish IBI score improvement
Livestock Exclusion Fencing	• Excessive Nutrients • Bacteria	Unknown	Fecal coliform testing Water quality testing that includes nutrients and TSS/turbidity monitoring
NRCS Comprehensive Nutrient Management Plan and other agricultural planning as needed	• Bacteria	Unknown	Completion and implementation of plans by NRCS staff and farmers
Additional Monitoring	• Bacteria	Unknown	Determine baseline fecal coliform figures from USFS land and potential sources

Estimated Costs

It is unlikely that implementation of every recommended project can occur in one grant cycle, so a phased implementation approach is suggested, starting with high priority projects first. Priority should also be given to projects with confirmed landowner willingness to participate. BMP costs are estimated using the USDA's EQIP Program FY 2015 Conservation Practice Guide sheet. Management Plan costs are estimated using the NRCS EQIP Approved FY 2015 CAP Payment Rates. Both documents can be found at the USDA website. See Table 16.

Table 16: Estimated BMP Costs

BMP Type	Number	Estimated Cost
Livestock Exclusion Fencing and/or alternative water source installation	2-10 projects	Animal Exclusion from sensitive areas: 1.56/ft., Animal Exclusion from riparian zone: $22.36/ac., 4 hole freeze-proof watering trough: $1,199 - $1,499
Agricultural Riparian Buffer Enhancement & Restoration Projects	3-8 projects	Riparian Herbaceous Cover, Aquatic Wildlife: $1,938/acre Filter Strips, Native Species: $181/ac.
Residential Riparian Buffer Enhancement & Restoration Projects	3-5 projects	$1,938/acre
Septic System Dye Testing	5-15 tests	No cost if completed through Health Dept.
Septic System Repair Cost Share	1 tank, installed	Septic tanks = $5,000 ea.
NRCS Comprehensive Nutrient Management Plan and other agricultural planning as needed	2 plans	Depends on type of plan, ranges from $800-$7,000
Additional Monitoring	N/A	Depends on number and frequency of samples in approved SQAP

Other Management Measures

There are other areas within the watershed that are not listed, but would benefit from improvements aimed at protecting water quality and habitat conditions. These activities may be implemented together with management measures identified to correct problems in listed stream segments, but funding priority should be given to activities in the listed sections first.

Load reduction calculations are not made for additional potential stressors because the data do not show that standards are being violated, or in some cases standards do not exist. However, general habitat improvements can be achieved through BMP implementation.

Deposited sediment appears to be impacting habitat in the mainstem and some tributary streams. It is suggested that some of the sediment load in the river can be attributed to development activities occurring between the 1870s through the early 1900s, when the valley first experienced population growth and large-scale timber harvesting. Some of this sediment was deposited in low terraces on tributary streams, forming a new floodplain. These low terraces have been documented as a sediment source due to lateral channel erosion, but this is not considered to be "legacy sediment" (Leigh 2012).

Another potential source of sediment in recent years has been the increase in residential second home development. However, this building trend has slowed significantly since 2007. Turbidity and TSS levels measured over the last four years were within relatively healthy ranges throughout the watershed, even for data collected during rain events. The most practical management measure to deal with the deposited sediment is to let it flush downstream naturally. Future sediment inputs from development should be managed through local ordinances and erosion and sediment control enforcement.

One general management measure that may help ensure future development impacts and sedimentation do not occur is to approach the Rabun County Board of Commissioners and ask that the Water Supply Watershed Ordinance be corrected to state that the Little Tennessee River is defined by the State of Georgia as a "small water supply watershed," or a watershed that has a drainage basin of less than 100 square miles. Small water supply watersheds have more stringent protective setback and riparian buffer requirements. While this designation has been used to protect water supply reservoirs in other parts of Georgia, the purpose here would be to protect water quality in the free-flowing sections of the Little Tennessee River. See Table 17.

Table 17: Other Management Measures

Possible Management Measures	Potential Stressors
Trash cleanups	• Poor Quality Habitat/Habitat Impacts • Dangerous to wildlife and humans
Public Education about herbicide use near waterways	• Poor Quality Habitat/Habitat Impacts • Toxic chemical concentrations instream
Changed management of dam releases at Barker's Creek Mill	• Sediment loading below dam
Additional Monitoring	• Undocumented stressors and impairments, especially on tributary streams
Riparian buffer enhancement project at Kelly Creek Park	• Poor Quality Habitat/Habitat Impacts • Sediment
Waste Management Outreach to processing facility on Kelly Creek	• Bacteria • Sediment
Change Road Maintenance Practices on USFS Road – Patterson Gap Road	• Sediment
Revise Rabun County Water Supply Watershed Ordinance Section 16-285	• Poor Quality Habitat/Habitat Impacts • Development • Sedimentation
Landowner Workshops on Buffer Management/Planting	• Poor Quality Habitat/Habitat Impacts • Sediment • Nonpoint source runoff control

Element 4: Technical and Financial Needs

Implementation will require a significant investment of time and financial resources. There is not an active watershed-specific organization working in the area, but the Land Trust for the Little Tennessee (LTLT) considers the Rabun County portion of the watershed to be within their service area. The organization's mission is to conserve the waters, forests, farms, and heritage of the Upper Little Tennessee and Hiwassee River Valleys. However, they currently do not have the capacity to take on implementation of this plan. The organization is an active partner in the development of this plan and has expressed interest in partnering for implementation.

Similarly, Rabun County has a UGA Extension Agent who has been cooperative and participatory in the planning process, but the mission of the Extension Service is to extend lifelong learning to Georgia citizens through unbiased, research-based education in agriculture, the environment, communities, youth and families. The Extension Agent is currently occupied with the objectives of that position and cannot take on responsibility for implementation. However, she has expressed interest in partnering and providing support for implementation activities. There are no government employees in Mountain City, the City of Dillard, the City of Sky Valley or Rabun County identified who have expressed a willingness to take on this role.

Therefore, the first step in implementation is to identify a responsible party who will agree to pursue funding and identify an implementation coordinator. EPD's 319 funding allows for such positions to be funded, but the grantee must be an educational institution or a governmental entity.

If the City of Dillard is not interested in continuing to be the grantee for the implementation phase, Rabun County government or the Chestatee-Chattahoochee Resource Conservation & Development Council (RC&D) may be the best organizations to take the lead on the grant and hire the Coordinator. However, neither organization has been approached to determine their interest or ability to do so. Another option may be to approach a local entity considered to be a "quazi-governmental entity" such as the Development Authority of Rabun County to see if they would be willing to partner and apply for implementation funds. While Rabun Gap-Nacoochee School is a qualifying entity, they may be more likely to partner on implementation projects and monitoring rather than take responsibility for the grant and Implementation Coordinator position.

A minimum of 2-3 years of implementation funds should be sought through an EPA 319 grant. An Implementation Coordinator position should be included in this request and structured as a full-time, short-term position to achieve the Phase I plan objectives. After the initial implementation phase is complete, the Coordinator position and the Watershed Management Plan should be reevaluated to determine whether additional funding is needed and to ensure that the forthcoming Keener Creek TMDL is adequately addressed in implementation activities.

Many of the BMPs recommended in this plan will require technical assistance and funding to implement. The Implementation Coordinator should seek partnerships with State and Federal agencies that have conservation programs that offer technical assistance and funding to address the stressors identified in this plan. Some of these programs are only available to nonprofit organizations, so the development of a diverse partnership is critical for successful implementation.

Technical and financial assistance resources that should be evaluated and/or pursued include, but are not limited to, the following agencies and programs:

Section 319 Nonpoint Source Implementation Grant (GA EPD) – funding for projects that will lead to direct reductions in pollutant loads and measurable water quality improvements.

USDA/NRCS Environmental Quality Incentives Program (EQIP) – established as a conservation provision of the Farm Bill, provides funding for agricultural BMPs that will help meet water quality goals.

USDA/NRCS – provides technical expertise and conservation planning for farmers, ranchers and forest landowners wanting to make conservation improvements to their land.

Chestatee-Chattahoochee RC&D - assists individuals and communities in utilizing and protecting natural resources while improving the economy, environment and quality of life.

UGA Extension Service – provides technical assistance to landowners on agricultural practices, water and soil testing and occasional landowner education workshops.

Blue Ridge Mountain Soil and Water Conservation District (SWCD) – provides soil and water conservation advice and technical assistance to landowners in Rabun County.

Northeast Georgia Regional Commission COG – provides assistance to local governments for planning, economic development, grant preparation, administration, job training, and aging services.

Partners for Fish and Wildlife Program – U.S. Fish and Wildlife Service – may provide technical and financial assistance to private landowners to restore or improve native habitats for fish and wildlife.

National Fish and Wildlife Foundation (NFWF) Five Star Restoration Grant Program – provides modest amounts of funding to develop community capacity to diverse local partnerships for wetland, riparian, forest and coastal habitat restoration, urban wildlife conservation, stormwater management as well as outreach, education and stewardship challenge grants for restoration projects involving partnerships.

Southeast Aquatic Resources Partnership (SARP) Aquatic Habitat Restoration Program – may provide funding for on-the-ground aquatic habitat restoration projects.

Georgia DNR Wildlife Resources Division – occasionally has small amounts of funding available for implementation of conservation activities and education in priority watersheds.

North Georgia Community Foundation Community Impact Program – Provides grant funding to 501c3 organizations in North Georgia only for projects that seek to improve the quality of life in the north Georgia region.

Georgia River Network Small Grants Program – provides small grants to grassroots river groups for projects in Georgia to directly impact high priority problems causing water quality degradation, impaired in-stream flows and/or inefficient use of water through advocacy, campaigns, on the ground project implementation, or legal work.

Georgia-Alabama Land Trust Tennessee Service Area Wetland and Stream Mitigation Project – funding that will result in the restoration, enhancement, creation, and/or preservation of wetland and stream resources in the Tennessee Service Area.

Farm Bill Programs – USDA –the Agricultural Conservation Easement Program (ACEP) provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits. The EQIP program (listed above) is also funded through the Farm Bill.

US EPA Environmental Education (EE) Grants - to support environmental education projects that promote environmental awareness and stewardship and help provide people with the skills to take responsible actions to protect the environment.

Local Funding – matching funds or investment from municipalities to partner with local conservation and civic organizations for specific projects.

Rabun Chapter of Trout Unlimited – collects donations from members to fund specific, modest stream habitat and restoration activities. Also provides in-kind volunteer labor.

Audubon/Toyota Together Green Grants – provides grant funding for innovative community-based conservation projects that conserve or restore habitat and protect species, improve water quality or quantity, and reduce the threat of climate change by reducing energy use and improving efficiency.

Audubon Cooperative Sanctuary Program for Golf - an education and certification program that helps golf courses protect the environment and preserve the natural heritage of the game of golf.

Georgia Adopt-a-stream - provides manuals, training, and technical support to increase public awareness of the State's nonpoint source pollution and water quality issues and encourage community participation in addressing these issues.

Conservation Reserve Program (CRP) - established as a conservation provision of the Farm Bill to encourage and assist producers who are willing to set aside environmentally sensitive land (highly erodible, riparian) for conservation benefits.

Key Partners and Roles

Some partners and positions are essential to the successful implementation of this plan, and one such position that has already been identified is the Implementation Coordinator position. Additional partners who will need to be engaged in implementation are detailed in Table 18.

Table 18: Key Partners and Roles

Organization	Role
Natural Resources Conservation Service	Conduct landowner outreach, provide technical assistance and complete technical management plans, serve as a liaison for EQIP/ACEP/CRP funding.
City of Dillard, Rabun County, Quazi-governmental Entity (such as DARC) **OR** Chestatee-Chattahoochee RC&D	Potentially serve as lead organization for implementation: pursue and manage 319 Watershed Restoration Grant, facilitate cooperative partnerships with agencies, non-profit organizations and other partners, hire Implementation Coordinator. Potentially provide in-kind match.
Chestatee-Chattahoochee RC&D	Provide technical assistance.
UGA Cooperative Extension	Provide technical assistance and connections with farmers. Conduct and participate in educational programs and public meetings.
GA DNR Wildlife Resources Division	Provide technical assistance and some monitoring support.
LTLT	Provide IBI monitoring information at select sites in the project area, help conduct educational workshops.
Coweeta Hydrologic Laboratory and Coweeta LTER	Provide water chemistry sampling units and educational demonstration tools.
Vulcan Materials Company	Riparian habitat improvement project, landowner of Kelly Creek Park.
RGNS	Provide technical assistance with developing fecal coliform monitoring plan and potentially equipment needed to incubate samples.
GA EPD 319 Grant Program	Provide funding for project implementation and grant management oversight.

Additional Needs

During the course of development of this plan, TAC members and other partners identified additional technical studies and needs that would help to better identify strategies for watershed conservation and restoration.

While some water quality monitoring is currently taking place under the NPDES watershed plan requirements for the cities of Clayton and Dillard, additional targeted testing is suggested. Daily monitoring of general watershed conditions in Wolffork Valley, Betty Creek and the mainstem Little Tennessee is proposed through the deployment of three stage samplers. Parameters that will be measured include DO, temperature, turbidity and conductivity. The units will be provided by Coweeta LTER. A volunteer or a group of volunteers need to be identified for regular calibration and battery maintenance. These units will sample hourly beginning in the late summer/fall of 2015 and continue for at least a year.

Another relatively accessible tool for conservation would be a simple landowner analysis to identify high priority lands for long-term conservation. Specifically, the group expressed a desire to explore land ownership patterns to look at large parcel ownership in areas with outstanding water quality and habitat, such as the Betty Creek watershed. Once identified, conservation funding and agreements could be pursued on lands that link up and form wildlife habitat corridors.

The group identified some more expensive and more technical needs as well. GIS analysis of buffer widths and floodplain habitat fragmentation is recommended. Ideally, an assessment of berms, banks and channel instability would also benefit future watershed planning and restoration efforts. A more in-depth analysis of gravel road inputs and other nonpoint source stressors is suggested as well. Since deposited sediment appears to be causing at least some habitat impacts, a sediment study is recommended.

An aquatic organism barrier assessment may also be completed to confirm suspected barriers and to identify potential barrier removal projects for the future. Combined, these analyses will require significant investment of expertise and funding.

Element 5: Education

Public education about water quality and resource protection strategies is an important part of this plan. The educational component will include targeted outreach, public presentations, and water resource protection material distribution. Target audiences include homeowners, watershed residents, youth and farmers.

Specifically, homeowners in areas where suspected failing septic tanks are located will be targeted for outreach. Farms with confirmed fecal coliform inputs through livestock access will also be targeted for personalized outreach. Public presentations about water quality protection and training opportunities for citizen science monitoring have been an integral part of this planning process, and they should continue into the implementation phase. Implementation should also include adaptation of existing North Carolina-specific educational materials for distribution in the Georgia portion of the watershed. Signage should be developed for use at restoration, enhancement and agricultural BMP projects to advertise the positive effects of these voluntary actions.

Strategy

Targeted Homeowner Outreach:

Working with Rabun County Health Department officials, contact with homeowners (via phone calls, personal visits or letters) should be made to upper Keener Creek residents and upper Darnell and Kelly Creek residents. Other areas suspected of septic failures should be identified and pursued. A handout about septic maintenance and care should be developed and distributed to these areas, along with free septic dye testing kits made available through the Rabun County Health Department. Follow up will be conducted on identified problem systems to find economic repair/replacement solutions.

LTLT recently produced a document called the "Landowner's Action Guide for Healthier Water" as an educational component of the Franklin to Fontana watershed plan implementation phase. The 21-page booklet provides landowners with information and technical resources about road maintenance, lawn maintenance, hobby farm management, home building, and conservation and restoration practices. This document can be distributed as-is to Georgia watershed residents, but it is specific to North Carolina programs and resources. Ideally this document would be revised to be Georgia-specific and provide contact information for Georgia programs and resources.

Another program at LTLT, called the "Shade Your Stream" program provides education and outreach to landowners about the importance of riparian buffers on water quality and aquatic health. This program also provides tips for natural buffer management. Funding should be set aside to edit (if necessary) these brochures and education materials and to reprint extra copies for distribution in the Georgia portion of the watershed. These brochures should be distributed at every public speaking engagement, training workshop and one-on-one landowner contact opportunity. This program has also had success with billboards displaying the program name and website, and funding should be secured to

post a billboard within the project area. Lastly, funding should also be earmarked to host landowner workshops on riparian buffer plantings.

Targeted Farm and Agriculture Outreach:

Farms and properties identified in this planning process with potential or confirmed livestock access to streams should be prioritized for outreach. The Implementation Coordinator should partner with local Agricultural Extension staff, Soil and Water Conservation Commission staff, and NRCS staff to conduct site visits together whenever possible. A one-sheet summary of available funding and cost-share assistance programs should be created prior to conducting this outreach, and the document should be distributed during each encounter. This audience should also receive "Shade Your Stream" brochures. A focus of these efforts should be on projects along the mainstem Little Tennessee where the river is listed for fecal coliform impairment.

General Landowner and Youth Outreach

Public presentations to youth groups, churches, 4-H clubs, Boy and Girl scouts, local civic organizations and other groups in Rabun County should be conducted throughout the initial phase of implementation. The presentations should explain the importance of watershed protection and encourage participation in implementation and monitoring of BMPs.

Macon County SWCD, located in Franklin, North Carolina, has an EnviroScape table that can be used at local fairs and festivals to demonstrate NPS principals to youth and adults. This is a very effective tool. Coweeta LTER has a number of youth-oriented demonstration kits for use in environmental education. LTLT has a staff person who has offered these educational tools and presentations in the North Carolina portion of the watershed and occasionally in the Georgia portion upon request. The Implementation Coordinator should partner with this staff person to begin offering these workshops regularly in the project area. This is a very low cost way to increase outreach to both youth and adults using resources that are already available.

Monitoring for success includes an educational component. Adopt-A-Stream workshops and Stream Visual Assessment Protocol (SVAP) workshops were held during the development of this plan, and these opportunities should be repeated during the implementation phase. SVAP is a good tool for a variety of audiences because it is extremely low cost, requires minimal technical training and is highly efficient. SVAP also produces results that correlate well with more costly and highly technical tools such as IBI, while educating on habitat issues in the process. The potential exists for ordinary citizens to evaluate many times the number of sites possible with traditional methods in a given amount of time. The cooperative effort with LTLT should be continued to host SVAP training workshops for local citizens, provided sufficient funding is secured either through the Georgia 319 nonpoint source grant program or another source. Once groups are trained, LTLT and the Implementation Coordinator can help facilitate data collection that will assist with measuring success.

Lastly, signage should be developed to signify a farm or landowner's participation in restoration and BMP installation. The resulting signage should be developed as a "badge of honor" for landowners who elect to participate in programs that protect natural resources and improve habitat. Research into similar programs elsewhere is needed in order to gain ideas, and this information could help to possibly implement, duplicate or expand any similar program.

Element 6: Implementation Schedule

Since grant funding for implementation has not yet been secured, the implementation schedule is written to identify general annual implementation goals that could be achieved with additional funding. An implementation start date will be identified once grant funds are secured. Ideally, project partners will work toward applying for an EPA 319 grant through the Georgia nonpoint source program to implement recommendations that will improve water quality outlined in this plan. Concurrent with this request for funding should be the identification of an organization to champion this effort. In addition, it is critical that the current project partners and TAC identify someone who is willing to take on a leadership role for implementation as Implementation Coordinator.

Table 19 outlines a potential implementation schedule based on a three-year project period.

Table 19: Implementation Schedule

Activity Description	Responsible Entity	Schedule		
		Year 1	Year 2	Year 3
Identify owners of agricultural lands	Implementation Coordinator, SWCC NRCS	X		
Conduct Ag. & Septic Landowner Outreach and Evaluate Projects	Implementation Coordinator & Misc. Agency Partners	X	X	
Provide Technical Assistance and Create Management Plans for Landowners	Misc. Agency Partners	X	X	X
Install BMPs	Implementation Coordinator and Partners	X	X	X
Update LTLT Educational Materials	Implementation Coordinator and LTLT	X		
Create Septic and Farm Educational Handouts	Implementation Coordinator	X		
Distribute Educational Materials	Implementation Coordinator	X	X	X
Develop Signage for Display at Project Sites	Implementation Coordinator	X		
Secure Billboard for "Shade Your Stream" Advertisement	Implementation Coordinator	X		

Activity Description	Responsible Entity	Schedule		
		Year 1	Year 2	Year 3
Host Citizen Science Monitoring Workshops (SVAP) and Buffer Planting Workshops	Implementation Coordinator and LTLT	X	X	X
Public Presentations at Civic Groups and Schools	Implementation Coordinator, LTLT and Coweeta	X	X	X
Conduct Biological Monitoring to Measure Success	LTLT	X	X	X
Develop Targeted Fecal Coliform Monitoring Plan and EPD-approved SQAP	Implementation Coordinator and RGNS	X	X	X
Conduct Bacterial Monitoring to Measure Success of BMPs	Implementation Coordinator and RGNS	X	X	X
Coordinate SVAP Monitoring Events	LTLT and Implementation Coordinator	X	X	X
Conduct Trash Cleanup Event(s)	Implementation Coordinator and Volunteers		X	X
Research and Acquire Additional Funding for Implementation	Implementation Coordinator	X	X	X

Implementation Summary

As part of this planning process, an implementation summary chart has been created to recap the recommendations of this plan with project priority ranking and cost information. The chart is organized by subwatershed/creek name, and identifies potential stressors, recommended BMPs and estimated costs. Additionally, the chart identifies responsible organizations/partners to lead on implementation activities. Since very few landowners have been approached to discuss potential management measures and suggested projects, the table is formatted to give a range of projects that could be completed once outreach work is initiated. This work should be phased depending on the number of interested landowners and the amount of funding received. See Table 20.

Table 20: Implementation Activity Summary Chart

Creek Name	Potential Stressors	Priority	BMP(s)	Estimated Cost	Responsible Organization/s
Keener Creek	Bacteria, habitat impacts, nutrients	High	Riparian buffer plantings/enhancement, livestock fencing, agricultural planning, additional monitoring, septic system testing	Animal Exclusion from sensitive areas: $1.56/ft., Animal Exclusion from riparian zone: $22.36/ac., 4 hole freeze-proof watering trough: $1,199 - $1,499, septic dye tests no cost, Water quality monitoring $50/sample.	Implementation Coordinator, NRCS, Rabun County Health Department, LTLT, RGNS

Creek Name	Potential Stressors	Priority	BMP(s)	Estimated Cost	Responsible Organization/s
Billy Branch	Bacteria, trash dumping	High	Agricultural planning, riparian buffer planting/enhancement, trash cleanup	Animal Exclusion from sensitive areas: $1.56/ft., Animal Exclusion from riparian zone: $22.36/ac., trash removal: $300 or less, Water quality monitoring $50/sample.	Implementation Coordinator, NRCS, LTLT

Creek Name	Potential Stressors	Priority	BMP(s)	Estimated Cost	Responsible Organization/s
Mainstem Little Tennessee - Wolffork Valley (and tributary streams)	Bacteria, habitat impacts, sedimentation	High	Riparian buffer planting/enhancement, livestock fencing, outreach activities, existing buffer conservation	Animal Exclusion from sensitive areas: $1.56/ft., Animal Exclusion from riparian zone: $22.36/ac., 4 hole freeze-proof watering trough: $1,199 $1,499, Residential Riparian Buffer Enhancement & Restoration Projects: $1,938/acre, Riparian Herbaceous Cover, Aquatic Wildlife: $1,938/acre Filter Strips, Native Species: $181/ac.	Implementation Coordinator, NRCS, LTLT

Creek Name	Potential Stressors	Priority	BMP(s)	Estimated Cost	Responsible Organization/s
Black's Creek	Habitat Impacts, bacteria, sedimentation	Medium	Riparian buffer planting/enhancement, livestock fencing, outreach activities	Animal Exclusion from sensitive areas: $1.56/ft., Animal Exclusion from riparian zone: $22.36/ac., 4 hole freeze-proof watering trough: $1,199 - $1,499, Riparian Herbaceous Cover, Aquatic Wildlife: $1,938/acre Filter Strips, Native Species: $181/ac.	Implementation Coordinator, NRCS, LTLT

Creek Name	Potential Stressors	Priority	BMP(s)	Estimated Cost	Responsible Organization/s
Black's Branch	Habitat Impacts, bacteria, sedimentation	Medium	Riparian buffer planting/enhancement, livestock fencing, outreach activities	Animal Exclusion from sensitive areas: $1.56/ft., Animal Exclusion from riparian zone: $22.36/ac., 4 hole freeze-proof watering trough: $1,199 - $1,499, Riparian Herbaceous Cover, Aquatic Wildlife: $1,938/acre Filter Strips, Native Species: $181/ac.	Implementation Coordinator, NRCS, LTLT
Jerry Branch	Bacteria, habitat impacts, sedimentation	High	Riparian buffer planting/enhancement, livestock fencing	Animal Exclusion from sensitive areas: $1.56/ft., Animal Exclusion from riparian zone: $22.36/ac., 4 hole freeze-proof watering trough: $1,199 - $1,499.	Implementation Coordinator, NRCS, RGNS

Creek Name	Potential Stressors	Priority	BMP(s)	Estimated Cost	Responsible Organization/s
Mainstem Little Tennessee - US 441 to Betty Creek Confluence	Habitat Impacts, bacteria, sedimentation	High	Riparian buffer planting/enhancement, outreach activities, septic system testing, additional monitoring	Animal Exclusion from sensitive areas: $1.56/ft., Animal Exclusion from riparian zone: $22.36/ac., 4 hole freeze-proof watering trough: $1,199 - $1,499, Riparian Herbaceous Cover, Aquatic Wildlife: $1,938/acre Filter Strips, Native Species: $181/ac., Septic dye tests no cost, Water quality monitoring: $50/sample.	Implementation Coordinator, NRCS, Rabun County Health Department, LTLT, RGNS

Creek Name	Potential Stressors	Priority	BMP(s)	Estimated Cost	Responsible Organization/s
Betty Creek (and tributary streams)	Sediment, nutrients, habitat impacts	Low	Existing buffer conservation, livestock fencing, coordinated one-on-one landowner outreach for targeted BMPs in select areas	Animal Exclusion from sensitive areas: $1.56/ft., Animal Exclusion from riparian zone: $22.36/ac., 4 hole freeze-proof watering trough: $1,199 - $1,499, Residential Riparian Buffer Enhancement & Restoration Projects: $1,938/acre, Riparian Herbaceous Cover, Aquatic Wildlife: $1,938/acre.	Implementation Coordinator, NRCS, LTLT, USFS, RGNS
Darnell Creek	Nutrients, trash dumping	Medium	Outreach activities, trash cleanup, riparian buffer planting/enhancement, septic system testing	Residential Riparian Buffer Enhancement & Restoration Projects: $1,938/acre, trash removal: $300 or less.	Implementation Coordinator, Rabun County Health Department, LTLT

Creek Name	Potential Stressors	Priority	BMP(s)	Estimated Cost	Responsible Organization/s
Kelly Creek	Bacteria, habitat impacts, sedimentation	High	Buffer planting/enhancement, additional monitoring, septic system testing, outreach activities, agricultural planning	Residential Riparian Buffer Enhancement & Restoration Projects: $1,938/acre, Riparian Herbaceous Cover, Aquatic Wildlife: $1,938/acre, Water quality monitoring: $50/sample, NRCS Comprehensive Nutrient Management Plan: ranges from $800-$7,000, septic dye tests no cost.	Implementation Coordinator, Vulcan, Rabun County Health Department, NRCS, LTLT
Mud Creek	Nutrients, habitat impacts, nutrients, sedimentation	Medium	Buffer planting/enhancement, outreach activities, agricultural planning	Riparian Herbaceous Cover, Aquatic Wildlife: $1,938/acre, Filter Strips, Native Species: $181/ac., Water quality monitoring: $50/sample, NRCS Comprehensive Nutrient Management Plan: ranges from $800-$7,000.	Implementation Coordinator, NRCS

Creek Name	Potential Stressors	Priority	BMP(s)	Estimated Cost	Responsible Organization/s
Lamb Creek	Sedimentation and habitat impacts	Low	Riparian buffer planting/enhancement, outreach activities	Residential Riparian Buffer Enhancement & Restoration Projects: $1,938/acre.	Implementation Coordinator, NRCS, LTLT
Mainstem Little Tennessee - Betty Creek Confluence to GA/NC State Line	Bacteria, habitat impacts, nutrients	High	Riparian buffer planting/enhancement, livestock fencing, existing buffer conservation	Animal Exclusion from sensitive areas: $1.56/ft., Animal Exclusion from riparian zone: $22.36/ac., 4 hole freeze-proof watering trough: $1,199 - $1,499, Riparian Herbaceous Cover, Aquatic Wildlife: $1,938/acre Filter Strips, Native Species: $181/ac.	Implementation Coordinator, NRCS, LTLT, RGNS, DARC

Element 7: Milestones

The following milestone table (Table 21) is based on a Georgia Section 319 Nonpoint Source grant application date of November 2015 and a start date of fall 2016. This represents a relatively short timeframe for grantee identification, partner coordination and grant preparation. If these ambitious goals are not met within the first few months of completion of this plan, the milestone table should be adjusted accordingly depending on the actual grant start date.

Table 21: Milestone Table

MILESTONE	STARTING DATES	COMPLETION DATES
Identify Lead Partner Organization for Implementation	ASAP	Oct. 2015
Apply for GA EPD 319 Implementation Funding	ASAP	Oct. 2015
Execute contract with the Georgia Environmental Protection Division.	Oct. 2016	Nov. 2016
Identify and confirm Implementation Coordinator (either contracted or existing grant recipient staff)	Nov. 2016	Dec. 2016
Identify and Secure Additional Funds needed for BMP installation	Jan. 2017	Dec. 2019
Complete Educational Handouts and Update Existing Educational Materials (4)	Jan. 2017	July 2017
With Partners, Identify landowners for initial ag. and septic outreach and conduct outreach activities (10)	Jan. 2017	Mar. 2017
With Partners, Complete Comprehensive Nutrient Management Plans for Selected Properties (2)	Mar. 2017	Mar. 2018
Corrective Actions Aimed at Bacterial Pollution – Complete Livestock Fencing Projects (2)	Aug. 2017	July 2019
Corrective Actions Aimed at Bacterial Pollution – Complete Septic Dye Tests (5)	Mar. 2017	Aug. 2017
Corrective Actions Aimed at Bacterial Pollution – Repair/Replace Septic System (1)	Jan. 2018	Dec. 2019
Riparian buffer restoration and/or enhancement projects - residential and agricultural (6)	Aug. 2017	Aug. 2019
Create Signage and Billboard for Advertising Project Activities	July 2017	Dec. 2018
Conduct Trash Cleanup Event	Sept. 2017	Dec. 2018

MILESTONE	STARTING DATES	COMPLETION DATES
Water Quality Monitoring Around Corrective Action Sites in Accordance With Approved SQAP	May 2017	Sept. 2019
Submit GA EPD Required Quarterly Reports	Jan. 2017	Nov. 2019
Conduct Workshops and Public Presentations (5)	Jan. 2017	Sept. 2019
Submit final project close-out report to the GAEPD and the USEPA for review and approval	Aug. 2019	Nov. 2019

Elements 8 & 9: Criteria for Measuring Progress and Monitoring for Effectiveness

The ultimate outcome of this plan will be to implement management and protection strategies that result in documented water quality improvements in impaired and potentially impaired stream segments. The end goal is to achieve water quality improvement in 303(d) listed stream segments so that they will meet Georgia's water quality standards and subsequently be removed from that list. The Implementation Coordinator will be responsible for tracking and reporting implementation progress.

Qualitative measures of success for the plan include:

- Successful completion of project milestones and associated qualitative targets (see Table 21)
- Publication of revised and newly created fact sheets and educational materials
- Attainment of educational presentation and workshop goals
- Commitments of additional funding for further BMP and educational projects

Quantitative measures of success for the plan include:

- Measurable improvements in applicable water quality parameters from pre and post BMP installation monitoring
- Increases in ecological health index scores of macroinvertebrate and/or fish communities in reaches near BMP locations
- Improved SVAP scores as tracked via pre and post BMP installation monitoring
- Tracking numbers of adults and youth participating in Adopt-a-Stream and SVAP monitoring programs
- Tracking workshops, speaking engagements, and demonstrations for local schools and civic groups

Progress towards these goals will be documented and reported to GA EPD in quarterly reports.

Short Term Monitoring

Bacterial load reduction progress measurements will be determined by bacterial sampling conducted according to the EPD monitoring plan and SQAP that will be completed at the beginning of implementation. The goal for fecal coliform pollution identified in the Little Tennessee River TMDL is reduction by 69%. Fecal coliform or E. coli monitoring plans developed for implementation should be organized to bracket suspected inputs (upstream and downstream) so that measurable changes can be documented once BMPs are installed. This type of monitoring will also help to initially identify and confirm sources of fecal coliform pollution. Goals will be refined and updated as the project moves forward and new data and information are obtained.

Coweeta LTER has offered to deploy 2-3 stage samplers to measure DO, temp, turbidity, and conductivity at three sites in the watershed. This will help project partners evaluate stream conditions in areas where other water chemistry monitoring efforts are not currently underway. Additionally, immediate installation of these sampling units will provide valuable baseline data for assessment of BMP effectiveness.

SVAP monitoring is typically conducted annually, and it will be a useful tool for short-term monitoring of changes in riparian cover and stream health. SVAP is also a useful tool to expand coverage of potential problem sites and to identify conservation opportunities because it is low-cost, efficient and can be completed with minimal training. SVAP evaluations will be conducted at all BMP installation sites before and after activities take place.

Long Term Monitoring

While the EPD and the WRD strive for consistent, long-term monitoring in all of Georgia watersheds, budgetary limitations severely affect the State's ability to do so. LTLT's Biomonitoring Program is designed to be a long-term monitoring program that essentially records stream health history, and it has contributed critical information on stream health that wouldn't otherwise be available. The program utilizes a diverse set of tools to document stream health including fish-based IBI, macroinvertebrate scores, and SVAP scores.

Drastic changes in biological communities may not be apparent in fish-based IBI scores within one year of BMP installation, but changes are likely to be documented within 2-5 years of BMP installation. Macroinvertebrate and SVAP monitoring may document both short-term and long-term improvements, and are an essential part of long-term monitoring. Therefore, the continuation and expansion of the entire Biomonitoring Program into the future (well beyond the first phase of implementation) is essential to the health of the entire upper Little Tennessee watershed. It should be a funding priority of all watershed stakeholders and partners to support the growth and maintenance of this program.

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APPENDICES

Appendix A: Public Input Meeting Notes

Public Meeting #1 - July 29, 2014

Larry Walker – representing water management council formed by state of GA to look at water availability. Savannah-Ogeechee study area took the Little Tennessee into consideration as well since it is just a small area adjacent to the Savannah watershed. Data and other useful information can be found there.

Also recommends looking at agriculture & forestry BMP guidelines when making recommendations for ways to address water quality problems.

IBTs are of concern; plan writer should consult with Rabun County and Water Authority.

Water quality will be affected by activity @ former Fruit of the Loom plant (FOTL)

Chemicals and temperature are of concern. Fertilizer also a problem, but can be dealt with by a buffer.

Interest in the effects of Vulcan operations on silt and sediment in the river. Expansion of 111 acres on Kelly Creek Road. Want to know if studies have been done in this area. Also the question was asked – how will this plan look at this expansion? White dust and granite from the facility has a lot of calcium – some people believe it is good for fish but is it?

There have been reports in the past about private wells in the area of the former FOTL plant going bad.

***Treatment of effluent is a concern to many people – includes sewage, industry, etc. – Multitrade was mentioned as a specific interest.*

Public Meeting #2 – August 7, 2014

Provide a link to LTLT data via Coweeta on littletnplan.com

People also want links for:

- *TMDL – Keener Creek*
- *EPA's surf your watershed*
- *Franklin to Fontana Plan*
- *Resources section*

Bed and Breakfast owner has tested her water and found DDT & bacteria – has concerns about drinking water.

Outreach/education suggestion – roads maintenance workshop

General erosion concerns – suggest one enforcement person for the whole county

Appendix B: Blank Copy of the Public Input Survey

Upper Little Tennessee River Watershed Plan Community Input Survey

Welcome!

Thank you for participating in this short survey.

This project focuses on the Upper Little Tennessee River in Rabun County, Georgia. The headwaters of the Little Tennessee River originate in Mountain City and Wolf Fork Valley, and the mainstem Little Tennessee flows into North Carolina just beyond the City of Dillard, GA.

The feedback that you provide here will be used to complete a watershed restoration plan for the Upper Little Tennessee River in Georgia. Thank you for your time and interest.

***1. Please describe your iterest in the Upper Little Tennessee River watershed:**

- ☐ I am a resident
- ☐ I am involved in a business or industry in the watershed
- ☐ I am a recreational user of the watershed
- ☐ I am involved in local government in the area
- ☐ Other (please specify)

***2. Which category below includes your age?**

- ○ 17 or younger
- ○ 18-20
- ○ 21-29
- ○ 30-39
- ○ 40-49
- ○ 50-59
- ○ 60 or older

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Upper Little Tennessee River Watershed Plan Community Input Survey

3. Which, if any, of the following recreational activities do you currently use the Upper Little Tennessee River watershed for? (please check all that apply)

- ☐ Swimming
- ☐ Tubing
- ☐ Kayaking/Canoeing
- ☐ Horseback riding
- ☐ Bird watching
- ☐ Nature photography
- ☐ Fishing
- ☐ Hiking
- ☐ Walking/jogging
- ☐ Stand-up paddle boarding (SUP)
- ☐ Hunting
- ☐ Camping
- ☐ N/A
- ☐ Other (please specify)

4. Why do you value the Upper Little Tennessee River watershed?

- ☐ I value it as an economic resource
- ☐ I value it for its scenic beauty
- ☐ I value it for the recreational opportunities it offers
- ☐ I value it as a drinking water supply
- ☐ I value it for the wildlife habitat that it offers
- ☐ I value the opportunity for solitude
- ☐ I value the land for farming and gardening
- ☐ Other (please specify)

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Upper Little Tennessee River Watershed Plan Community Input Survey

***5. What concerns do you have about water quality in the Upper Little Tennesee River Watershed?**

- ☐ Septic system problems/straightpipes
- ☐ Industry and factory waste
- ☐ Low fish numbers
- ☐ Erosion and sediment
- ☐ Water temperature (too warm)
- ☐ Metals/other pollutants that you can't see
- ☐ Pharmaceuticals in waterways
- ☐ Lack of trees and shrubs along the river and streams
- ☐ Bacteria in water
- ☐ Waste from sewage treatment plants
- ☐ Too much development
- ☐ I do not have any concerns about water quality
- ☐ Parking lot runoff and stormwater
- ☐ Agricultural impacts
- ☐ Other (please specify)

6. Please list the top three areas of the watershed that you feel have the BEST water quality and habitat.

stream/creek/community name:

stream/creek/community name:

stream/creek/community name:

7. Please list any areas of the watershed that you feel have problems with water quality and habitat.

stream/creek/community name:

stream/creek/community name:

stream/creek/community name:

stream/creek/community name:

stream/creek/community name:

8. What are the problems with water quality and/or habitat in these areas?

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Upper Little Tennessee River Watershed Plan Community Input Survey

9. In your opinion, what are the barriers to addressing water quality and habitat problems in the Upper Little Tennessee watershed?

- ☐ Lack of interest in the community
- ☐ Not enough money to address the problems
- ☐ No knowledge of the source of the pollution
- ☐ The problems are too big to do anything about
- ☐ Lack of leadership to implement change
- ☐ Other (please specify)

10. If you would like to be contacted with more information about the planning process or opportunities to volunteer, please provide your contact information.

Name

Email Address

Phone Number

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Appendix C: Dillard WWTP and Rabun County WRF Compliance History Charts

Three Year Compliance Status by Quarter

Statute	Program/Pollutant/Violation Type	Discharge Point	Frequency	QTR 1	QTR 2	QTR 3	QTR 4	QTR 5	QTR 6	QTR 7	QTR 8	QTR 9	QTR 10	QTR 11	QTR 12	QTR 13*
CWA (Source ID: GA0047139)				01/01-03/31 2012	04/01-06/30 2012	07/01-09/30 2012	10/01-12/31 2012	01/01-03/31 2013	04/01-06/30 2013	07/01-09/30 2013	10/01-12/31 2013	01/01-03/31 2014	04/01-06/30 2014	07/01-09/30 2014	10/01-12/31 2014	01/01-03/31 2015
	Facility-Level Status			Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	In Viol	Unk	Und
	SNC/RNC History			W(N/A)	W(N/A)	W(N/A)	W(N/A)	W(N/A)	W(N/A)	W(N/A)	W(N/A)	W(N/A)	W(N/A)	N(RptViol)	W(N/A)	
CWA	Coliform, fecal general	0B0	NMth											117%		

*Quarter 13 is draft/unofficial and has not been fully quality assured. Read more

Three Year Compliance Status by Quarter

Statute	Program/Pollutant/Violation Type	Discharge Point	Frequency	QTR 1	QTR 2	QTR 3	QTR 4	QTR 5	QTR 6	QTR 7	QTR 8	QTR 9	QTR 10	QTR 11	QTR 12	QTR 13*
CWA (Source ID: GA0039152)				01/01-03/31 2012	04/01-06/30 2012	07/01-09/30 2012	10/01-12/31 2012	01/01-03/31 2013	04/01-06/30 2013	07/01-09/30 2013	10/01-12/31 2013	01/01-03/31 2014	04/01-06/30 2014	07/01-09/30 2014	10/01-12/31 2014	01/01-03/31 2015
	Facility-Level Status			No Viol	No Viol	No Viol	No Viol	No Viol	No Viol	No Viol	No Viol	In Viol	In Viol	In Viol	Unk	Und
	SNC/RNC History											W(N/A)	W(N/A)	W(N/A)	W(N/A)	
CWA	BOD, 5-day, 20 deg. C	001	Mthly											26%		
CWA	Phosphorus, total [as P]	001	Mthly									70%				
CWA	Phosphorus, total [as P]	001	NMth									27%				
CWA	Temperature, water deg. fahrenheit	STR	Mthly										2900%			

*Quarter 13 is draft/unofficial and has not been fully quality assured. Read more

Appendix D: Rabun County IBT Resolution 2011-01

RESOLUTION 2011-01

WHEREAS, the Rabun County Board of Commissioners unanimously adopted the Statewide Water Plan Resolution on January 22, 2008, which acknowledges the negative impacts of interbasin transfers of water on both originating river basins and receiving river basins; and

WHEREAS, the Rabun County Board of Commissioners believes that the surface and ground waters of the state should continue to be managed in the public interest and in a sustainable manner to protect natural systems and meet human and economic needs; and

WHEREAS, without a continuous supply of clean water from Rabun County, population growth and economic development is at risk in the communities of the Little Tennessee, Tallulah and Chattooga River basins; and

WHEREAS, downstream communities in Georgia rely on certain flow levels in river basins for current and future economic development, recreation, and environmental quality; and

WHEREAS, transferring water from one river basin to another can adversely affect downstream communities and unfairly redistribute economic growth; and

WHEREAS, Georgia's statewide water plan outlines a number of factors that must be considered in evaluating current and future transfers of water from one river basin to another; and

WHEREAS, these factors were adopted by the consensus of stakeholders throughout Georgia and should therefore have the force of law; and

WHEREAS, Georgia currently has no enforceable regulations of the transfer of water from one river basin to another:

NOW THEREFORE BE IT RESOLVED THAT RABUN COUNTY urges the General Assembly of Georgia to pass a statute that regulates the transfer of water from one river basin to another so as to avoid harm to current and future downstream economic growth and harm to the natural health of the watershed.

SO RESOLVED this 22nd day of February, 2011.

RABUN COUNTY, GEORGIA

L.S.
Stanley E. Darnell, Chairman

L.S.
Tom Garrison, Commissioner

L.S.
Katheryn Granberg, Commissioner

L.S.
Jimmy Loudermilk, Commissioner

L.S.
Will Nichols, Commissioner

Attested to:
Debbie Jacobs, Clerk

Appendix E: Data and Report Inventory Charts

Type	Source	No. Stations	Start	End	Parameters	Frequency	Comments
Biological	LTLT	38	1990	2014	Fish IBI	Older sites have been done once, fixed stations recurring every few years or when possible.	Extensive field notes
Visual	LTLT	38	2007	2014	SVAP	Varies depending upon volunteer interest	Newer sites only - Stream Visual Assessment
Biological	WRD	5	2004	2005	Fish IBI	Varies depending on funding and staff time.	
Water Quality	WRD	5	2004	2005	Temp., DO, Cond.,pH, Turbidity, Alkalinity	Varies depending on funding and staff time.	

Type	Source	No. Stations	Start	End	Parameters	Frequency	Comments
Water Quality	RGNS	8	2014	2015	Temp, DO, Cond.,pH, Turbidity, E. coli, alkalinity, P ortho, nitrates	Quarterly	Adopt-a-stream protocal
Water Quality	City of Clayton	7	2011	2014	Temp, DO, Cond.,pH, Turbidity, Fecal Coliform, P ortho, P total, Ammonia, Inorganic nitrogen (nitrate and nitrite)	Varies between 2x/year and 5x/year	Measurements taken for permit compliance
Water Quality	USGS	1	1990	2001	Temp, Cond.,pH, Turbidity, Fecal Coliform, P ortho, P total, Ammonia, Inorganic nitrogen (nitrate and nitrite), other chemicals	Varies	Only for 246 site

Type	Source	No. Stations	Start	End	Parameters	Frequency	Comments
Flow	USGS	4	1950	2014	Discharge, CFS	Varies per site	Mtn. City, Betty Creek, FOTL. Only FOTL and 246 still being collected.
Groundwater Water Quality	FOTL/Private Firm	31	2006	2014	Turbidity, pH, temp, Conductivity, ORP, DO	Varies per site	Remediation in progress for contaminated groundwater plume. Chloroform and Trichlorethene contamination.
Groundwater Chemical/VOC	FOTL/Private Firm	31	2006	2014	VOC, alkalinity, arsenic, minerals, chloride, nitrate, sulfate, TOC	Varies per site	Remediation in progress for contaminated groundwater plume. Chloroform and Trichlorethene contamination.
Visual	Dillard/ Broadfork	N/A	2014	2014	Visual observations of streambank and instream habitat conditions, buffer thickness, livestock locations, etc.	One time only	Mainstem Little Tennessee Between 441 and 246 via boat, driving tour of public roads for tributary visuals.

Type	Source	No. Stations	Start	End	Parameters	Frequency	Comments
Climate	NOAA	1	2002	2015	Air temp, precipitation	Daily	
Water Quality	GA EPD	4	1973	2013	Temp., DO, Cond.,pH, Turbidity, Alkalinity	Varies for old data, Monthly at Darnell	2013 at Darnell Bridge by USFS Shooting Range (Above Ridges of Rabun), 246(Copy of USGS), Greenwood and Lamb Road (State Line)
Bilogical	TVA	1	2006	2006	Fish IBI, EPT	One sample event June 21, 2006	Due for revisit in 2016

Type	Source	No. Stations	Start	End	Parameters	Frequency	Comments
Water Quality	Coweeta	4	2009	2010	Various water quality parameters	two sample events per site, one winter and one summer	

Document Title	Date	Author	Description	Website
Total Maximum Daily Load Evaluation for Nineteen Stream Segments in the Tennessee River	Jan-04	GA EPD	TMDL for mainstem Little Tennessee, identifies stressors and load reduction targets.	http://www.epa.gov/waters/tmdldocs/EPD_Final_Tenn_Fecal_TMDL.pdf
TMDL Implementation Plan, Little Tennessee River Watershed	Apr-06	Georgia Mountains RDC	TMDL Implementation Plan for mainstem Little Tennessee River - describes management measures needed to achieve pollutant reduction loads.	http://epd.georgia.gov/sites/epd.georgia.gov/files/tmdl/TMDL_Implementation_Plans
Savannah-Upper Ogeechee Initial Recommended Regional Water Plan	May-11	Savannah-Ogeechee Water Planning Council	Assesses drinking water and WWTP capacities and surplus/shortfall projections, provides suggested management strategies for quantity issues.	http://www.savannahuperogeechee.org
Rabun County Comprehensive Plan	Nov-05	GA Mountains Regional Develoment Center	Comprehensive plan for development, includes Cities of Clayton, Dillard, Mountain City, Sky Valley. Stats on projected population, housing & infrastructure needs.	http://rabuncounty.ga.gov/planning-zoning/docs/Comprehensive_plan.pdf
City of Sky Valley Water Supply Protection Plan	Sep-08	City of Sky Valley	Ordinance for the protection of water supply watershed. Outlines development limitations and min. buffer requirements IF raw water intake is constructed on Mud Creek.	http://skyvalleyga.com/uploads/2/8/7/6/2876499/water_supply_watershed_protection_plan_2008.pdf

Document Title	Date	Author	Description	Website
2011-2013 Monitoring Report, Former Rabun Apparel Site	2011-2013	Duncklee & Dunham	Summary of annual groundwater monitoring data and results associated with Burlington toxic spill remediation.	N/A
Landfill Monitoring Report, Former Rabun Apparel Site	Unknown	Unknown	Describes mandatory moniotoring activity at the landfill that was formerly part of the Rabun Apparel/FOTL property. Landfill was closed in July 2012.	N/A
Rabun County Joint Solid Waste Management Plan	9/1/2010, Revised Feb 2012	GA Mounatins RDC	Reviews Rabun's SW practices, resources and projected future needs.	http://www.dca.state.ga.us/
Clayton-Rabun County Watershed Monitoring 2011 Progress Report	Jun-12	Environmental Management Inc. (EMI)	Summarizes the purpose for sampling and the parameters sampled. Also provides background information on water quality stressors and summarizes initial findings from data.	N/A
Miscelleneous IBI Summary Reports	1990-2015	Dr. William O. McLarney	Annual IBI summaries and special reports that review IBI trends over time.	N/A

Document Title	Date	Author	Description	Website
GA State Wildlife Action Plan (SWAP)	2015	GA WRD	Management plan that outlines actions to protect Georgia's exisitng wildlife and habitats to prevent species decline and expensive recovery efforts. Current revision still in draft form and open to public review and comment.	http://www.georgiawildlife.com/conservation/wildlife-action-plan

	Area 1: Wolffork Valley (also Parkdale)				Area 2: Mainstem/Black's/Jerry		Area 3: Betty		
	Blue Ridge Gap	Keener Creek (Pasture)	Mainstem Littl T (Confl. Keener & Billy	441 Bridge (Upstream)	441 Bridge (Downstream)	Kelly Creek Road (Mainstem)	Various Upper Betty Sites/Tribs	Betty Creek (DS from Community School)	Betty Creek at RGNS Footbridge
WRD		x						x	
LTLT		x		x	x		x	x	x
RGNS	x		x	x		x			
USGS									
EPD									
TVA									
City of Clayton					x				x
Visual Survey	x	x	x	x	x	x	x	x	

	Area 4: Mainstem-Franklin/Greenwood/Darnell/Kelly (Vulcan & FOTL)					Area 5: Mainstem-246/State Line/Mud/Lamb			
	Franklin St. Bridge (FOTL)	Kelly Creek Road (Darnell)	Darnell Bridge (Shooting range)	Kelly Creek Park	Greenwood Drive	Mud Creek Sky Valley	Mud Creek at RV Park	246	State Line (Lamb Road)
WRD			x				x	x	
LTLT	x	x			x	x	x	x	x
RGNS	x	x			x				x
USGS								x	
EPD			x		x				x
TVA									x
City of Clayton				x	x	x	x		x
Visual Survey	x	x	x	x	x	x	x	x	x

Summarize Data: Data by Type

Biological
- GA WRD
- LTLT/ McLarney
- TVA

Chemical
- RGNS
- GA WRD
- City of Clayton
- EPD
- USGS
- Coweeta

Visual
- Broadfork
- McLarney IBI Notes
- Aerials

Appendix F: TMDL for the Tennessee River Basin and TMDL Implementation Plan

The TMDL plan for the Little Tennessee River can be found online at: http://epd.georgia.gov/sites/epd.georgia.gov/files/related_files/site_page/EPD_Final_Tenn_Fecal_TMDL.pdf

The TMDL Implementation Plan for the Little Tennessee River can be found online at: http://epd.georgia.gov/sites/epd.georgia.gov/files/TMDL_TMDLPlan_List_2011_updated.pdf